Technical Scrapbook, Cat. 1153

This scrapbook covers the period January-February 1888. The entries are by Edison. Included are notes and drawings relating to phonographs, ore separators, lamps, a pyromagnetic generator, and a telegraph recorder. The name of Mina Edison appears as a witness on some of the documents.

Received July 6, 1888
Pelton & Dyer

Orange January 4 1888

Dyer —

Here is something new Prepare an application Its on the line of the pyromagnetic Dynamo —

The object is to transform the heat Energy of Coal Etc directly into Electricity without the intervention of a Steam Engine or other prime mover, The invention Consists in causing heat to expand rods tubes, sheets etc of metals or expansible material in such a way as to open & close a magnetic circuit, Which magnetic current is surrounded with a coil of wire upon which the lines of force acts inductively

The invention further Consists in arranging a number of such simple devices together to obtain continuous Electric Currents by commutating, the Electric Current, & alternately cooling & heating a portion of the devices. Get continuously

The invention further consists in various details.

Many attempts have been made to construct prime motors by utilizing the Expansion & Contraction of solid matter; but the Expansion & Contraction between ~~non~~ practicable limits is so small that mechanical means are of no avail to obtain motion sufficient for practical purposes; The problem is to get motion or Energy capable of use from the Exceedingly small movement due to expansion; I have solved this problem and am enabled to utilize barely perceptible motion for obtaining Light ~~heat~~ & power for running machinery with great Economy of fuel. I have found that the resistance of air to magnetic lines of force or stress is about 1200 times that of soft iron, That ~~about~~ short magnets divided in two parts with their faces accurately ground to fit together like two surface plates, and magnetized nearly to saturation can scarcely be pulled apart by the direct pull of two Oxen: but if the faces are seperated $\frac{1}{200}$ of an inch The attraction is reduced enormously on account of the sudden interposition in the magnetic circuit of ~~a~~ a layer of air whose specific resistance to magnetic stress is 1200 times greater.

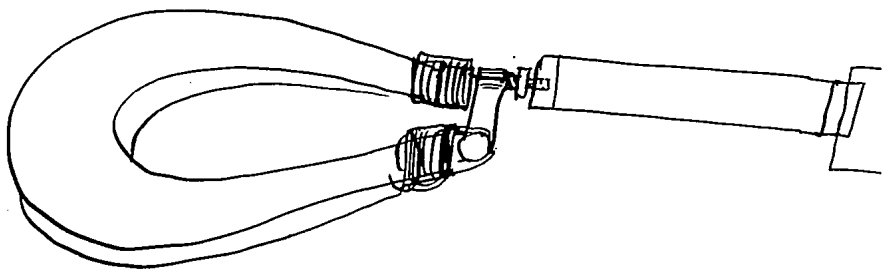
If one 1/2 of the magnetic circuit be covered with wire it can be magnetized to saturation, while the other 1/2 being also coiled with wire, this coil will receive a powerful induction wave at the moments when the ~~force of~~ magnetic circuit is opened or closed $\frac{1}{200}$ of an inch or less; Which movement is produced by the Expansion of stretched metal, By this means I am enabled to obtain the full value of the almost irresistable force of Expansion in solids for practical purposes

Fig 1 Shews one single unit of the Generator K K ~~with~~ are sheets of soft Nickel. secured to the End pieces H.L. & being secured to the Central hub M of the Generator. The magnet & Central hub are rigidly connected together by radial arms shewn by dotted lines fig 2 A is the magnetizing Coil. B the generating Coil The magnetic break occurs within the helix B at c, d. the part of magnet moveable ~~is fixed~~ has a bearing at N. F is a nut connected to a right & left handed tightening Screw for adjusting the

tension on the Expanding device,
Fig 3 shows a section of the Generator over a furnace, X fig 3 & 4 is the revolving grand plate Etc Dyer the action is the same as pyromagnetic Generator.
instead of having Commutator wheels right over furnace I use Spur gear & take the Com device away from the heat, both shafts making same revolutions allows me to do this
I have shown no smoke stack, or regenerative devices mention that these would complicate the description & will be the sub matter of small application!

When no heat in furnace the contraction of K.K. etc open magnetic circuit & the charging of the magnets is insufficient to draw the circuit closed but when the furnace is started the heat soon reaches a point where the Expansion is enough to allow closing whereupon we get a powerful inductive wave in B

By starting the ~~field magnets~~ Induction magnet with a small Battery They may be made to build up or it may be disconnected, Of course horse shoe magnets can be used



Mention that I do not confine myself to sheets of metals for Expansion but tubes with thin walls, wires and other forms can be used — fig 6 shows The method of using liquids the Expansion being produced by hot water or steam through copper pipes coiled in a small closed chamber with piston, the coils being immersed in the liquid used

a number of fig 6 being arranged
with a ratching wheel which serves to
open & close the steam cocks of the
various devices successively. The details
of which will be shown in another application

Dyer – I suppose we had better call this
the Pyromagnetic Dynamo, (1st) Improvement

Very broad claims ought to be obtained
The only instance where currents have been
generated by breaking actual contact between
iron & armature is in the Breguet Exploder
but this was done by hand & moved an inch
or more, doing it through comparatively infinitely small
distances by expansion is I think entirely
new, The use of a magnetizing coil is new
The arranging with commutators is new.
The devices are new, The Liquid Expansion device
with mag is new all the devices are new
Let me see what you can do —

Edison

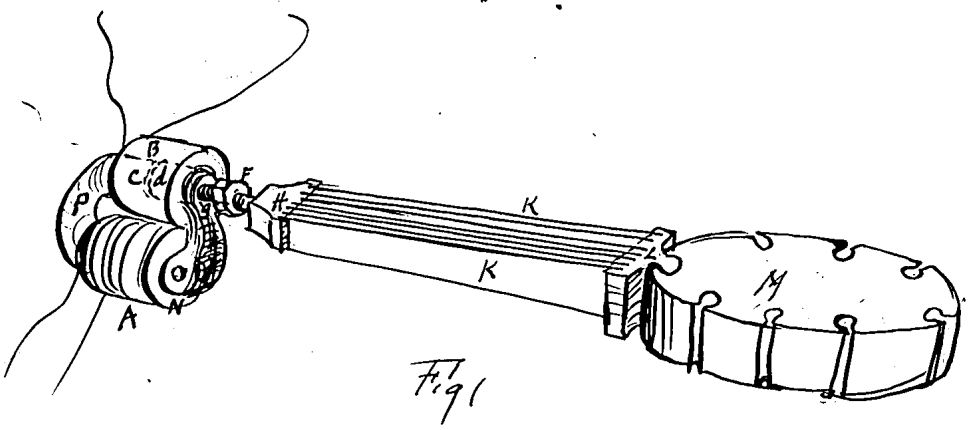


Fig 1

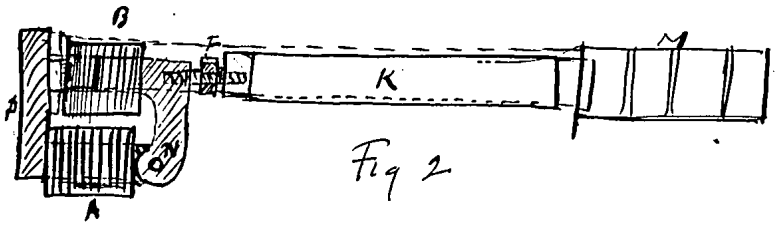


Fig 2

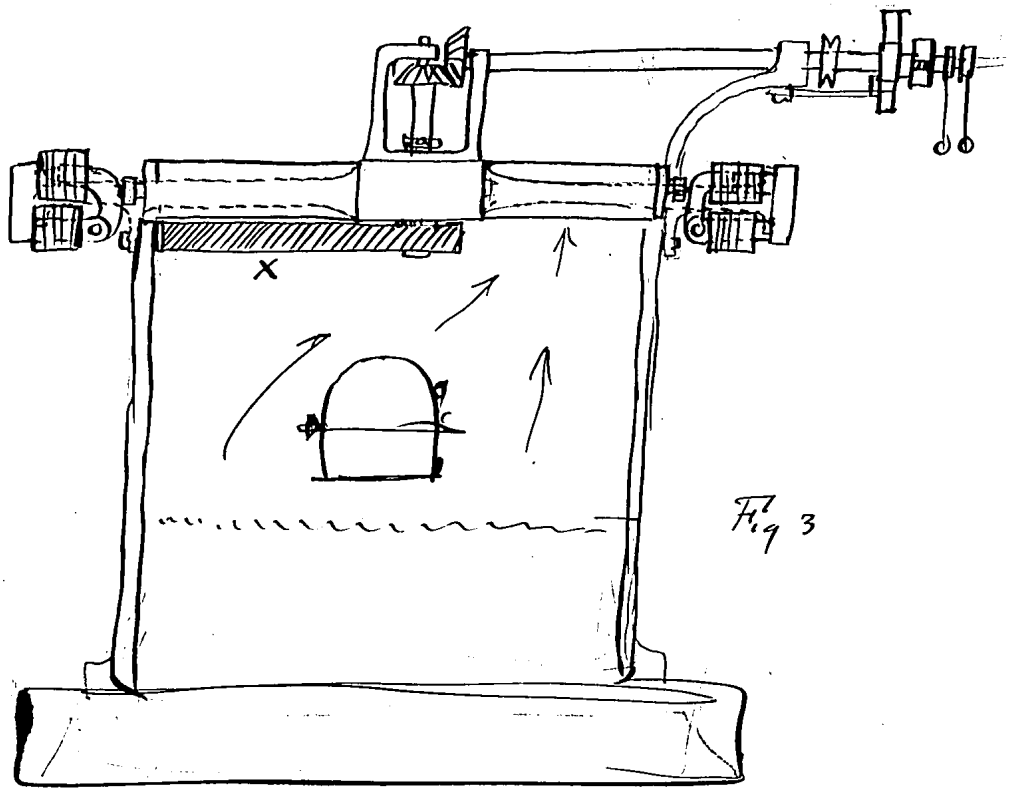


Fig 3

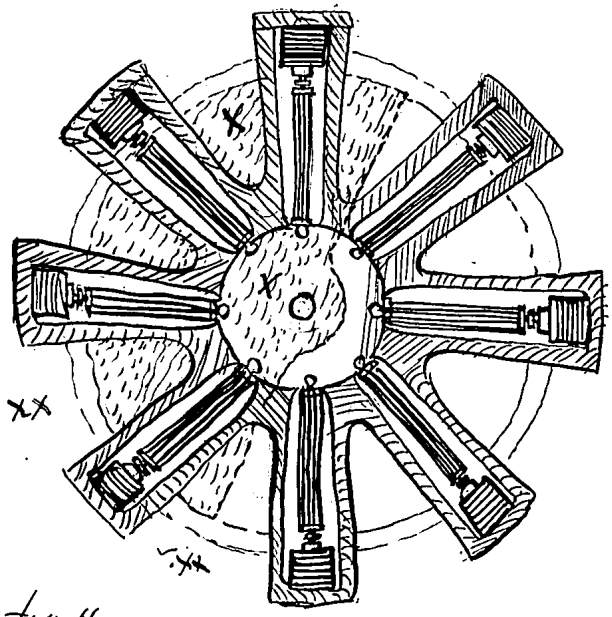


Fig. 4.

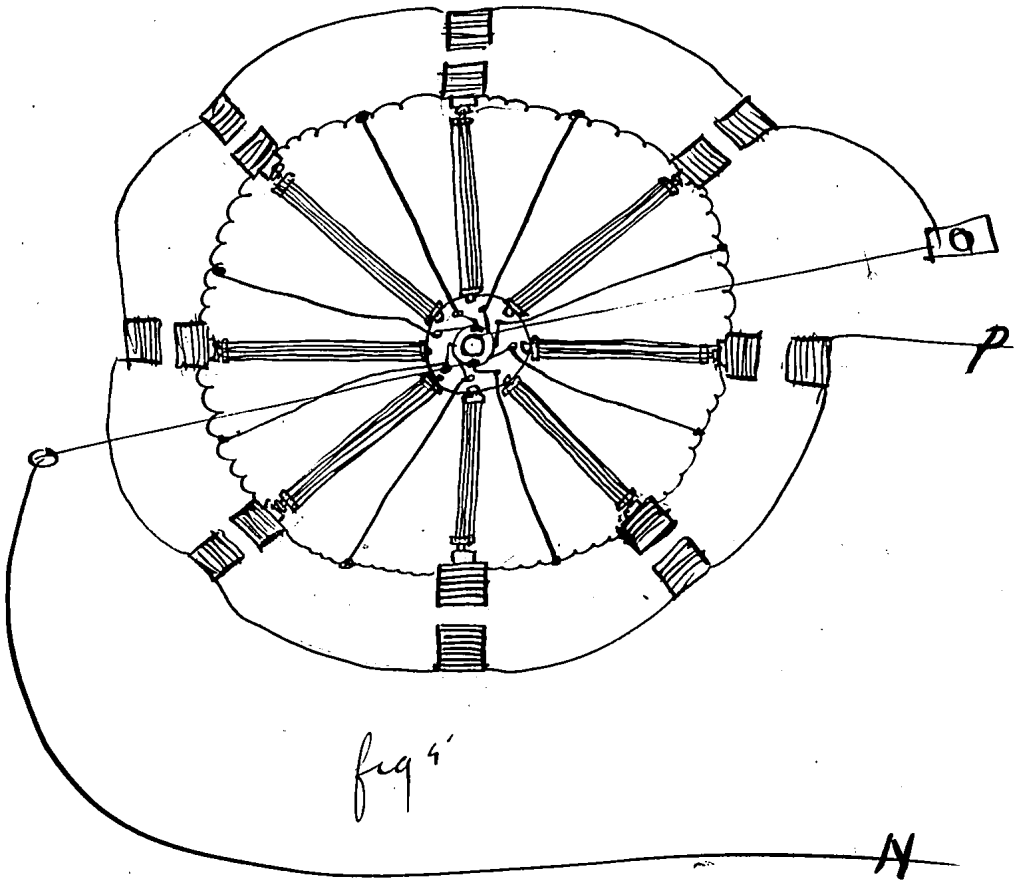
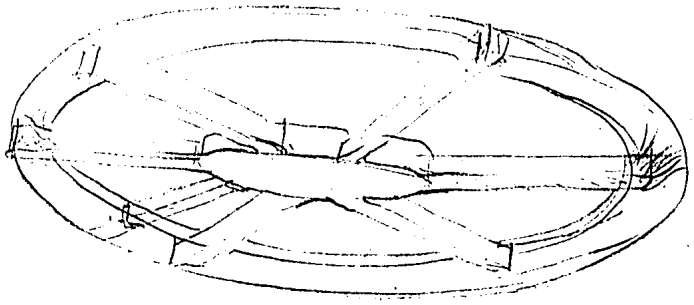
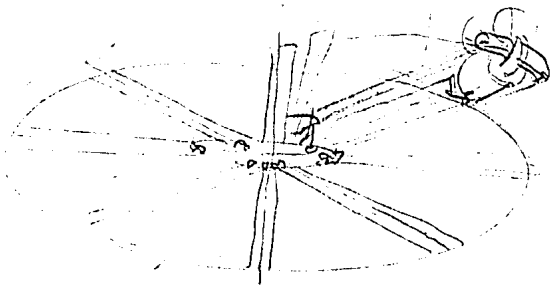


fig 4





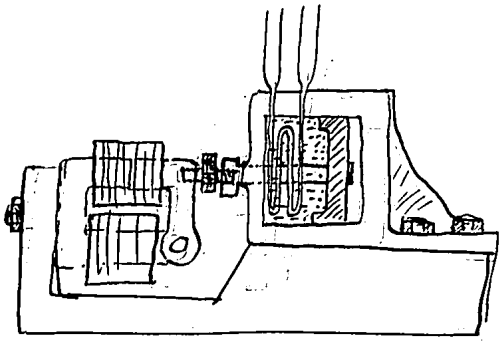


fig 6

Rec'd Jany 18 '88.
R. A. Dyer.

Orange N J Jany 17/88

Dyer
Patent,

The object of this invention is the economical production of perfect phonogram cylinders —

The invention consists in the method of moulding the same and finishing to a perfected article,

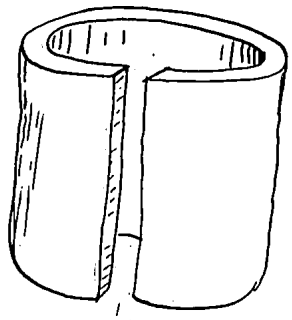
Cylinders formed of waxes, gums or mixtures of the same when poured from a melted state into a mould contract enormously on cooling especially those mixtures suitable for phonogram cylinders hence it is a very difficult matter to mould hollow tubes or cylinders wholly of ~~the~~ such material, the great shrinkage causing the same to crack notwithstanding the various devices employed — The moulds are also complicated & expensive and experts must be employed

To abviate the great expense for apparatus and to produce cylinders of great perfection, I divide the circumferential Continuity of the cylinder by a narrow strip placed in the mould, on pouring the liquid in the same the same is not continuous around the circumference on cooling. instead of the cylinder contracting inwardly & thus cracking it contracts both directions from the dividing piece, ~~What~~ without the slightest danger of distortion or cracking. It may be left to cool in the mould. When cold the ~~[illegible]~~ shell has contracted in thickness sufficiently to be easily removed from the mould. As it comes from the latter there is a break of about $\frac{1}{4}$ of an inch principally due to contraction; The cylinder is then put on a mandril or cylinder of metal, tapering until it fits. End pieces are fitted at the extremities of the break. This break is poured full of

hot wax which perfectly fuses to the edges of the break, quickly cools & the cylinder is made continuous and ready for the shaping lathe. The cylinder is clamped lightly in a chuck & a cutting tool set on a taper bores it out to a uniform taper corresponding to the taper of the cylinder of the phonograph. Afterwards the cylinder is placed on a mandrel & its face is turned off true. The phonogram blank is now ready for use —

Will it be necessary to take out a patent. This is a good thing so draw broad claims. These terrible contractions don't seem to have been encountered in any other industrial operations,

Edison



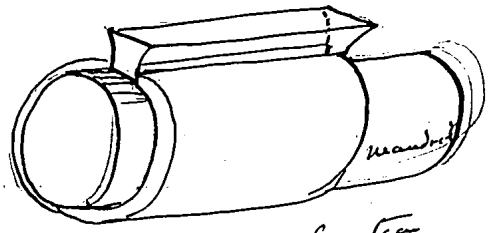
1st Operation

break

dividing piece

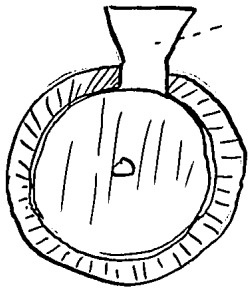
outside of mould

inside of mould



mandrel

2nd Operation



pouring funnel

Received Jany 14 88
Richard H. Dyer

Orange N.J. Jany 10/88

Dyer Patent,

Improvement in Thermo electric battery

Object of this invention production of Electricity direct from heat,

Invention consists in rotating or moving the two Thermo electric metals

2nd Consists in heating one Element direct to a high temperature while the other is only heated by Conduction,

3rd Keeping one Element at a high temperature at its contact surface & the opposite metal at a low temperature where the two come in contact & maintaining these great def of temperature continuously

~~As the Current Electromotive force depends upon the difference of temperature~~ The small wheel is of Copper the large of Iron a blowpipe flame for illustration keeps the Copper wheel red hot, while the iron wheel being a poor Cond^r of heat & being exposed to the air while in rotation remains comparatively cool. any loss of heat from the Copper wheel is continually supplied by the flame. The large wheel is run by an Electromotor supplied by Current generated or by other motor. The small Copper wheel being in bearings on a moveable arm is held against the wheel with considerable force & rotates with it = Spring contacts serve to make good contact with the respective shafts –

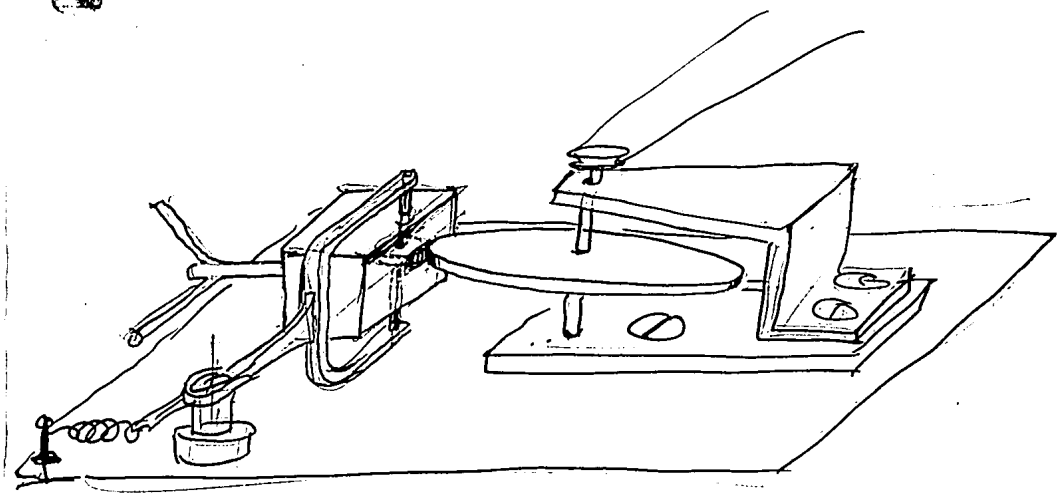
fig. 2. Shows general accessory wheel of Copper which are not heated but serve to keep the iron wheel cool at the same time generate a current while cooling which can also be utilized but which is small compared to the current from the heated wheel – It is obvious that many modifications can be made and that any of the suitable Thermo Electric metals may be used,

The application of this invention for various purposes will be the subject matter of other applications –

Dyer. rotating or rubbing Thermo surfaces is I think new 2nd Heating one continuously & keeping the other at a lower temperature at point of contact is new fig 3 shows rubbing contact heated on one side & arranged so flame or copper not in contact doesn't give heat to wheel by conduction or radiation.

This arrangement gives 35/40 of a Volt – Claim Everything within or about patents

T.A.E.



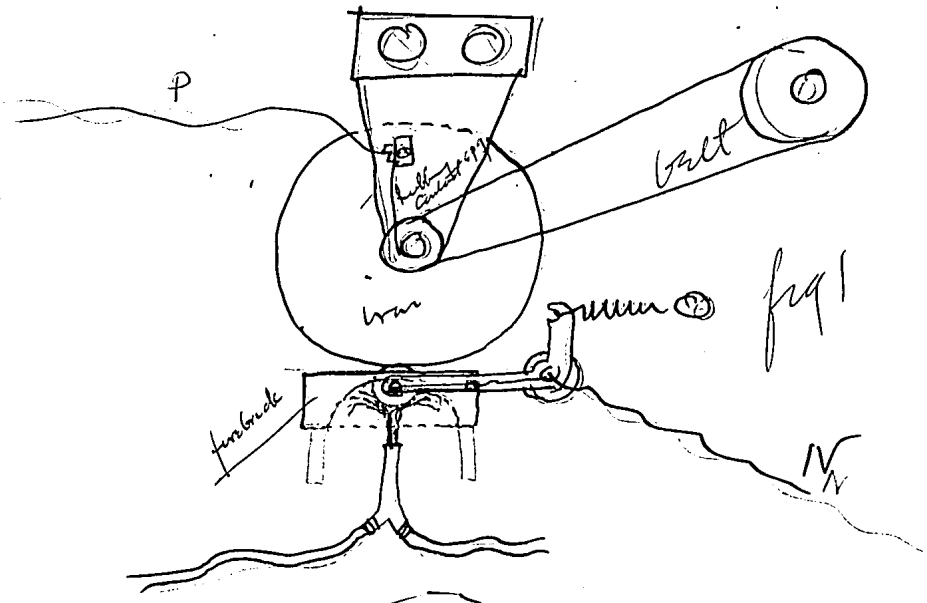


fig 1

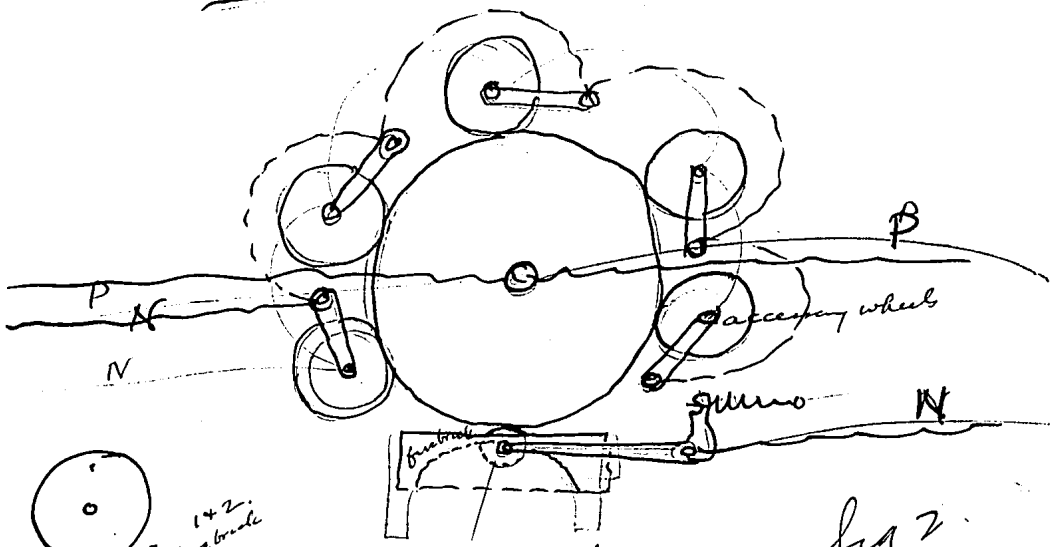


fig 2

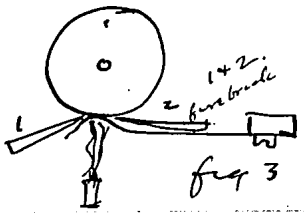


fig 3

Recd Jany 18, 88 N.W. Dey

Orange Jany 14 1887

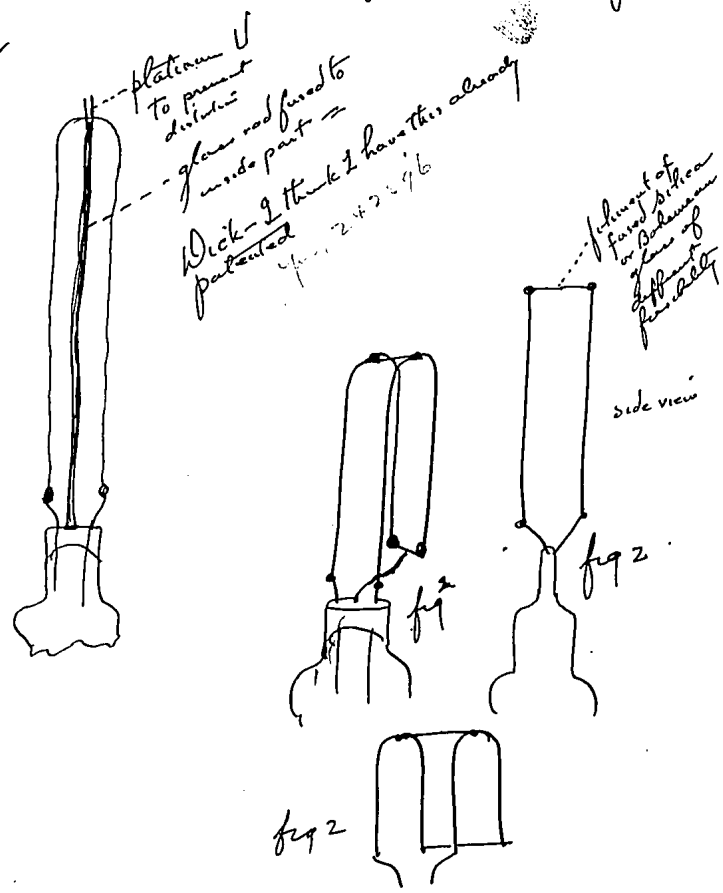
Dyer & Rabert,

The object of this invention is to construct incandescent lamps of a candle power generally in use 16 candles of very high resistance, so that high electromotive force can be used and this diminish the investment in the copper conducting cores as the manner how very well known.

The invention consists in the employment of an angle very long thin filament of carbon supported in the center of its incandescent part or the use of ~~two or the~~ two or more filaments ~~in two or more parts~~ & causing them to be ~~one part~~ mechanically connected to ~~the~~ one other by a non conducting medium.

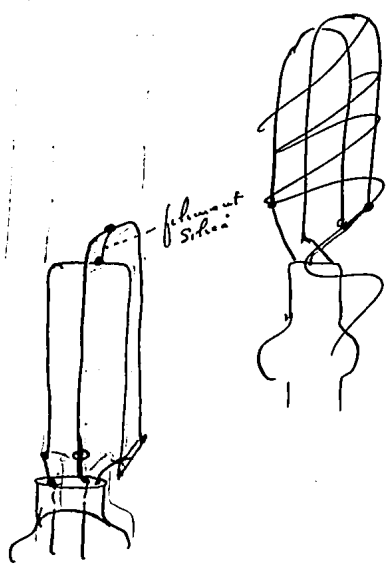
It is now well known that there is a very considerable attraction between the electrified surface of the glass globe and the filament which of course is charged statically in the opposite way and this tends to draw the filament if very long & flexible towards the glass - distorting it & in many cases causing the

filament to touch the glass when the lamp is distroyed, On the other hand when we ~~[illegible]~~ put two filaments in the globe the mutual repulsion & attraction of the current traversing the filaments increases the distortion. The object I have in view is the prevention of this distortion,



These filments of insulating material are secured to the carbon by a carbon paste, filments of pure Silica melted by the Oxyhydrogen blowpipe — ~~Asbestos or thread of alumina spun~~ or the most infusible bohemian glass can be used without danger of melting. The small quantity of carbon paste at the junction of the filment of carbon & thread of insulating material serves by its increased radiating surface to reduce the temperature at that point below the fusing or softening point of the glass —

The form I prefer to use is this



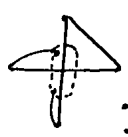
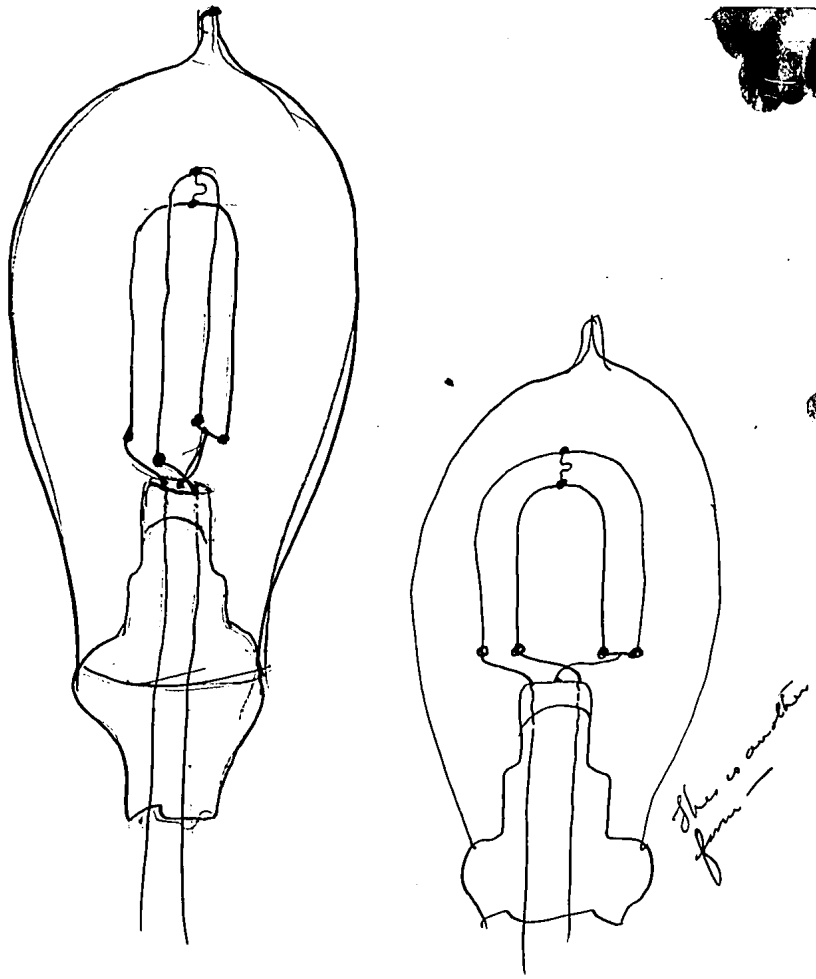


fig 3

Top view

filments at right angles one 3/16 inch longer than the other & connecting thread between

This makes a very stable combination,



This shows to better, the filament of Silica is bent ⸮ to allow of Expansion

These various forms especially figure 3 gives a very pleasing form of radiating surface very much superior to the method of getting a long filament by coiling as is sometimes done, another advantage ~~offer~~ over the coiling arrangement is that the filament is not unequally heated by radiation from one spiral to another, that better filaments can be made in the carbonizing process with filaments not coiled,

Make good strong claims in view of what I already have –

Claim the mechanical non conducting support for holding two or more filaments to prevent distortion. The Right angle arrangement. ~~Then~~ The use of a paste in this connection –

Now Dick here is a fine point. No one but myself has ever constructed a lamp giving 200 volts across its terminals within a single vacuum chamber.

All makers used flashed Carbons, this would bring Volts down to 125 or so by using an unflashed Carbon I can use 200 or more, No one before myself has ever used two filaments to get 16 Candles of unflashed Carbon in one Vac Chamber - No one has ever been able to make a 16 cp lamp requiring 200 Volts to give 16 Candles —

Isn't it possible to Cook up a claim that will hold Lamps of this Character — Think it over + let me hear from you —

E

Rec'd Jany 1888
R. N. Dyer

Dyer Patent - Orange Jany 17 1888

The object of this invention is to produce a good material for the Phonogram Cylinders which will give Loudness & clearness of articulation & freedom from excessive ~~non~~ scraping sound. I have ascertained from a large number of experiments that to obtain these results The ordinary waxes of Commerce are not sufficient. They ~~either too hard or too~~ mostly too soft ~~or too soft to~~ and it is essential to use a hardening material mixed with them. For this purpose I have discovered that Carnauba Wax is the best hardener for mixing with the various soft waxes, and it may be used in various proportions up to the point when, it is such quantity as to cause ~~excessive~~ scraping sound. Carnauba Wax itself is very hard & brittle & utterly unfit for material for phonogram. ~~Whereas~~ The various qualities of Beeswax Spermaceti, Ceresin may have from 10 to 50 per cent ~~of~~ of Carnauba Wax mixed with them

without practically increasing the scraping sounds in the phonograph. The increasing percentages continuously increasing the volume of sound clearness of articulation & convenience of turning off the face of the cylinder up to the point where the Carnauba wax is in such excess as to evince its presence by scraping sounds. Some waxes such as paraffine cannot be made to disguise the hard scraping sound producing properties of Carnauba, but beeswax perfectly disguises it up to 50 percent or more according to the temperature of the phonogram cylinder when manipulated. The percentage of Carnauba wax to be added will depend on the shape of the recording point. If very fine a large percentage can be added than if not so fine, I do not wish to confine myself to any particular proportion of Carnauba with the other waxes as they may be varied & produce proportionate results according

to the character of the phonograph in which the cylinders are used.
I desire to claim the use broadly of Carnauba ~~or similar wax~~ wax or wax of like composition as a general hardener of the after waxes for phonograph cylinders

Edison

Feby 22 '88

Dyer

Change the Kneading cephalinthus

after phonogram is ready deposit with silver in Vacuum or graphite Electrolytic process. then plate with lead or tin, about 1/16 inch thick. dissolve out wax saw the cylinder through once so it can be bent flat, it is then bent around a cylinder and secured to the same by cement, forming an knead, or it can be laid flat and the cylinder to be reproduced passed over it like a lithograph press or stone. = The latter preferable method =

Edison -

Clami. Alpha Centauri Orion a the pole star — —

Recd Feb 29, 88

Feby 27/88

The object of this invention is to improve the methods of separating magnetic from non magnetic particles.

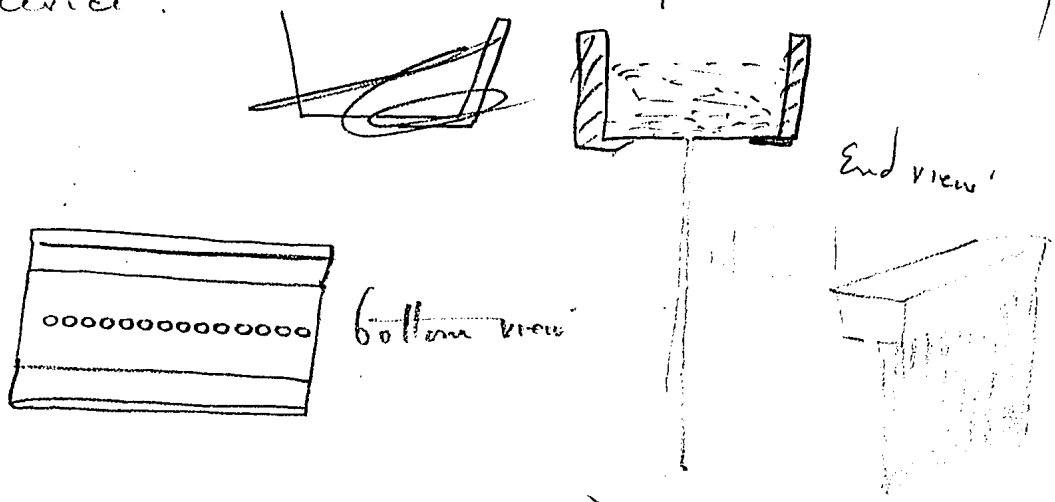
The invention consists of a peculiar delivery hopper which permits the powder to fall straight and not be spread out into a wide stream

Heretofore in Magnetic or other separators V shaped hoppers have been used with a narrow slit at the bottom, The particles are thus given an angular motion The result being a stream of particles which widens greatly as it falls

This

~~my hopper~~ This makes it very difficult to separate the magnetic from the non magnetic by alterations of the trajectory especially when the material is very fine as in auriferous pyrites

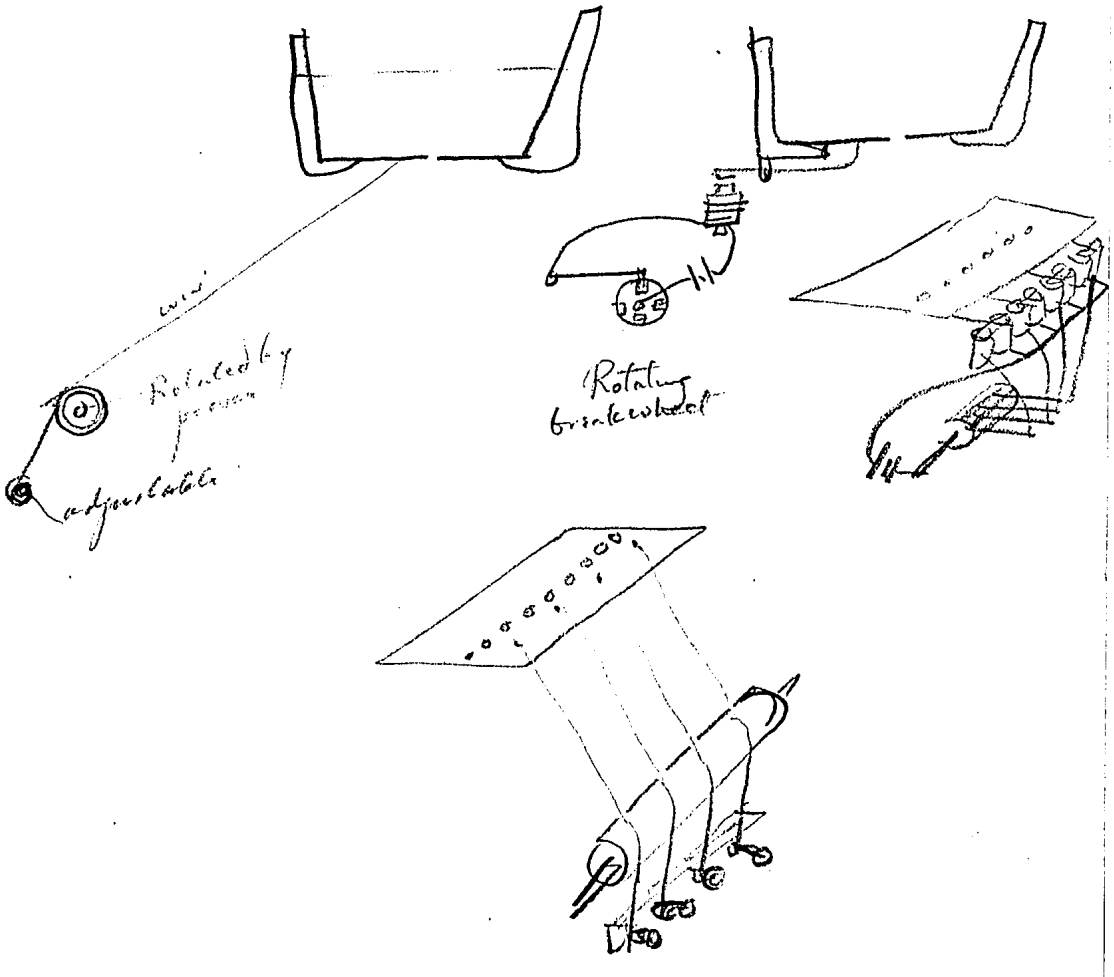
I have found that the stream can be almost prevented from spreading by the following device.



If the hopper be kept filled the particles leaving the thin sheet brass by the holes fall perfectly straight and continue so for a foot or more but gradually spread out by action of the air — The space between the holes causes the whole stream on its first start to appear as a number of streams but at some distance from the hopper these coalesce & form one sheet. Thus the particles are all widely separated from each other which is very essential for perfect separation when the largest portion of the material is magnetic.

when the ore or material is very fine & a very fine sheet of falling particles is essential the holes must be very small say for 100 mesh material the holes should be 3/64 of an inch and 1/32 apart, when this small the powder will not pass through. To obviate this the brass plate is made to receive vibrations like the vibrations of a phonograph diaphragm ~~of~~ or a plate bowed by a violin bow, this acts the particles in vibration & the pass freely through the holes, this vibration can be produced by a series of levers connected to magnets or by wires connected to different parts of the hopper plate, these wires receiving longitudinal vibrations by passing over a revolving wheel covered with leather & surfaced with Rosin -

See Cuts,


wire
Rotated by person
adjustable
Rotating brake wheel
Disc

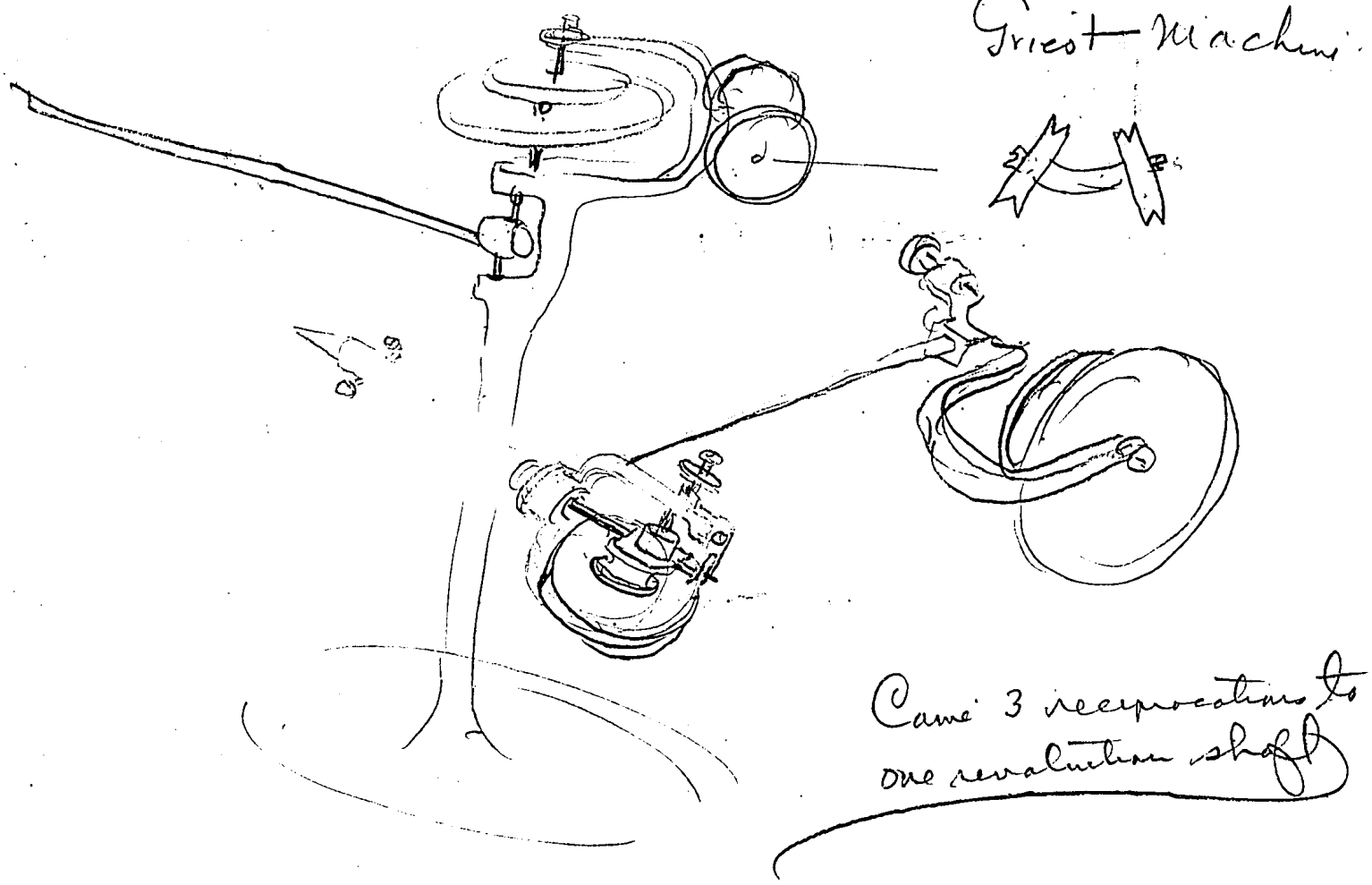
5

Dick —

This is a real big advance
Carry it up as much as possible.

Edison

P.S. a straight slit 3/64 wide
can be used just as well as
the holes, but the stream is
thicker edgewise and does not
give so perfect a separation
as particles are closer together
some of the magnetic particles
lock the rows together when in
close proximity to each
other — still the slit is good
so don't confine it to holes


Griest Machine
Cam 3 reciprocations to one revolution shaft

Copy.

"The real object of this letter is to lay before you, a new manufacture of porcelain lately discovered, and now in work here. I inclose you a short Circular describing its merits, and virtues. I have also instructed the Agent here to forward at once to your address, a small case of samples of insulators for Telegraph wires made of this porcelain, as it is in this branch that we hope and expect particularly to do a very large business having received some very encouraging trial orders, it is thought that for this special purpose it will be highly successful, owing to its being perfectly non-absorbent, and therefore absolutely impervious to damp. I may add that every description of article now made in earthenware and porcelain can be made by this new process for exactly the same cost as common earthenware goods are now made.

I shall shortly send you a parcel of Sample tiles for flooring and making walls, &c &c. which I think will meet with the highest approval of yourself, and any one you may show them to, more especially if they are in the porcelain and earthenware trade. I doubt not that the insulators sent you, are the wrong pattern for your market, as they are made to the pattern used by our Govt. but this is of no consequence as they can be made with equal ease to any pattern, or size, so if you will get a pattern of those used on your side we can supply you with any quantity you may get orders for. In order to prove how every non-absorbent this manufacture is, I would ask you, to break one of the samples and on the fractured piece, put a large quantity of ink let it remain as many hours or days as you please and then with a damp cloth, wipe the ink away, and you will

have no trace remaining, with the ordinary earthenware this is not the case, as, if the same test is applied you will find that the material being spongy the ink will be absorbed as in blotting paper and impossible to remove.

I will write you fully as to the terms we can offer and prices we can quote, in the mean time if questions are asked you as to price you can say, that the price corresponds with the prices now paid for the ordinary earthenware manufactures of this Country"

THE EDISON ELECTRIC LAMP CO.,

Thos. A. Edison,
Chas. Batchelor,
Francis R. Upton,
Edward H. Johnson.

Menlo Park, N. J., 188

~~This invention consists~~

The object of this invention is to increase the economy of lighting by ~~incandescence~~ electrical incandescence.

The invention consists of the employment of chlorine to remove the hydrogen which is ever present in lamps consisting of carbon filaments, to ~~prevent~~ diminish electrical carrying which shorten the life of the filaments, and also to diminish the loss of heat due to the action of Hydrogen ~~gas~~ by causing the same to enter into combination ~~therewith~~ with the Chlorine to form Hydrochloric acid gas ~~which enters into combination with Copper to form compound~~ & finally combination with the residual gas being Chlorine & Hydrochloric acid gas does not carry heat from the carbon filament to any extent thus carrying less ~~energy~~ electrical energy to be used to give a certain [illegible] and the electrical [illegible]

is also greatly diminished hence the life of the Carbon filament is greatly prolonged

Obviously after the lamp bulb containing the Carbon filament is exhausted so that there is a high vacuum (dry) Chlorine gas is ~~then~~ admitted until the vacuum is reduced to 1 mm. when the vacuum is again raised and moderately high the filament of Carbon is brought to incandescence. Continued until nearly all of the Chlorine is removed & high vacuum is attained. the lamp is sealed off & is ready for use, ~~Thereby [illegible] gas which may come out of the filament when the lamp is in the process of [illegible] which may [illegible] of Carbon fail to [illegible] in the chamber will cause the~~ another Convenient method is to have an auxiliary tube leading from the bulb containing a chloride such as the Chloride of Antimony, Carbon

THE EDISON ELECTRIC LAMP CO.,

Thos. A. Edison,
Chas. Batchelor,
Francis R. Upton,
Edward H. Johnson.

Menlo Park, N. J., 188

and other suitable ~~[illegible]~~ Chlorides which can be volatilized by heat when the globe & the Champha been exhausted ~~[illegible]~~ & the air as far as possible removed from the Carbon by heating it with the Current & the auxiliary tube be heated by a lamp either to decompose the Chloride ~~[illegible]~~ & Cause it to give out free Chlorine or drive the Volatilized Chloride into the globe where coming in ~~contact~~ with the incandescent Carbon frees it of Hydrogen & leaves a metal & the two gases mentioned if a metallic Chloride is used or deposits Carbon on the on the filament if a chloride of Carbon be used ~~or if the chloride of a Hydrocarbon~~ Bromine or other heavy gas may be used that will Combine with the Hydrogen

Claim

In an Electric lamp giving light by incandescence the use of Chlorine to remove the Hydrogen.

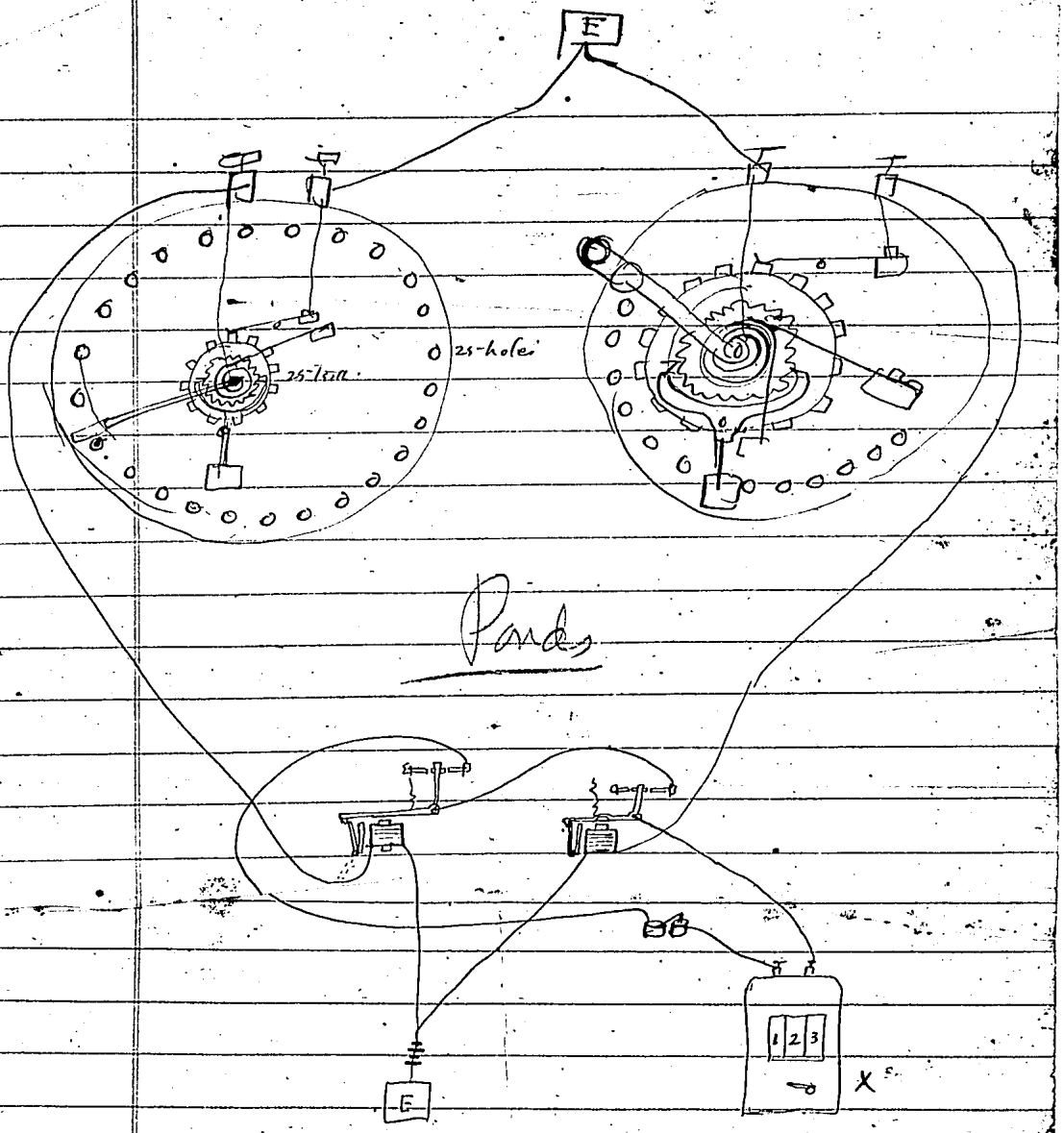
In an Electric lamp giving light by incandescence the use of Chlorine to form the residual gas —

In an Electric lamp giving light by incandescence the use of a Chloride of an element within such lamp while in the act of being made or afterwards.

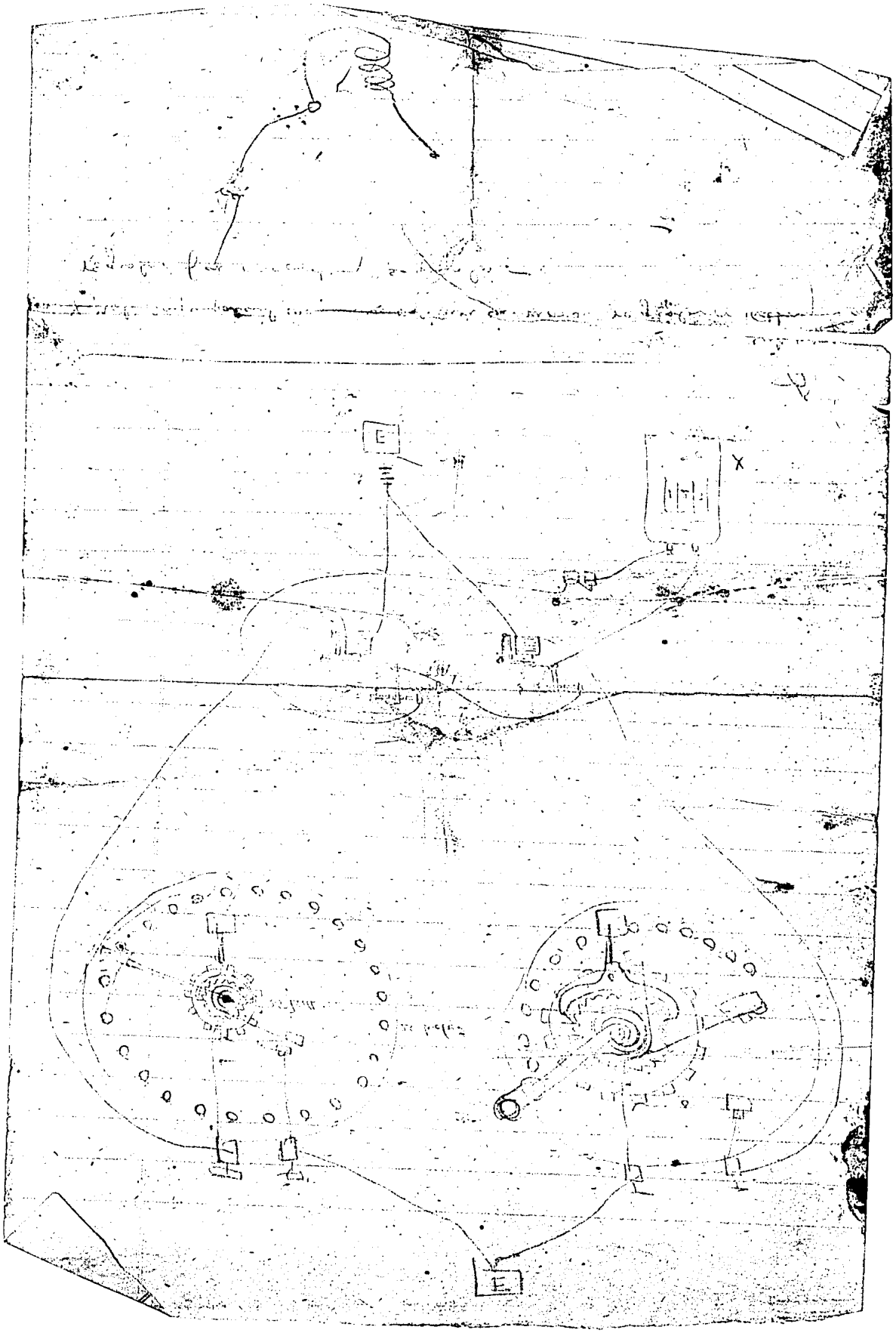
The use of Bromine Chlorine or any heavy gas that will combine with Hydrogen —

The use of a metal within the lamp which will combine with Chlorine so as to increase it to increase the degree of expansion

The use of a Chloride of Carbon



X-nate say potential we can substitute ~~a~~ more regular or ~~[illegible]~~ regular for recording signals —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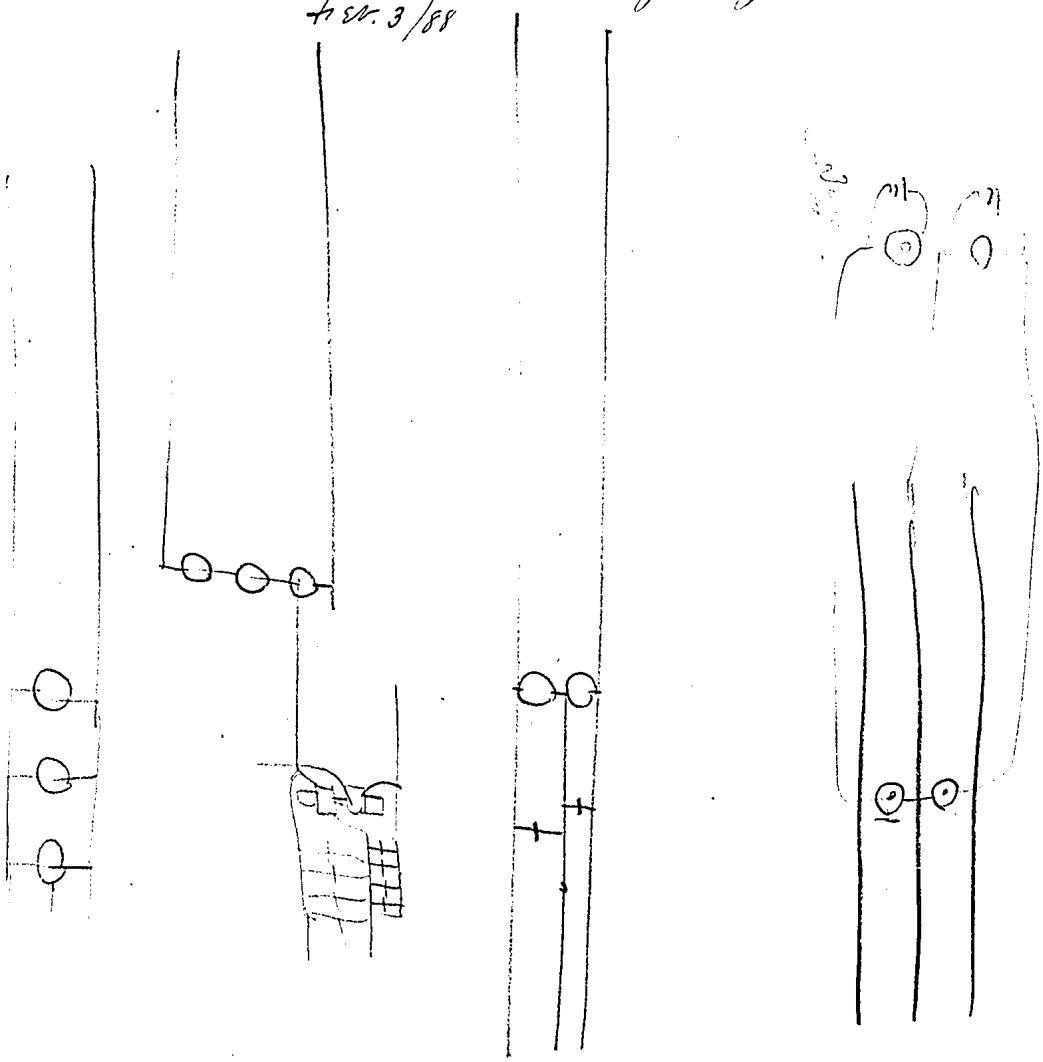
From the Laboratory of Thomas A. Edison.

Mina M. Edison Orange, N.J., _____ 188

Feb. 3/88



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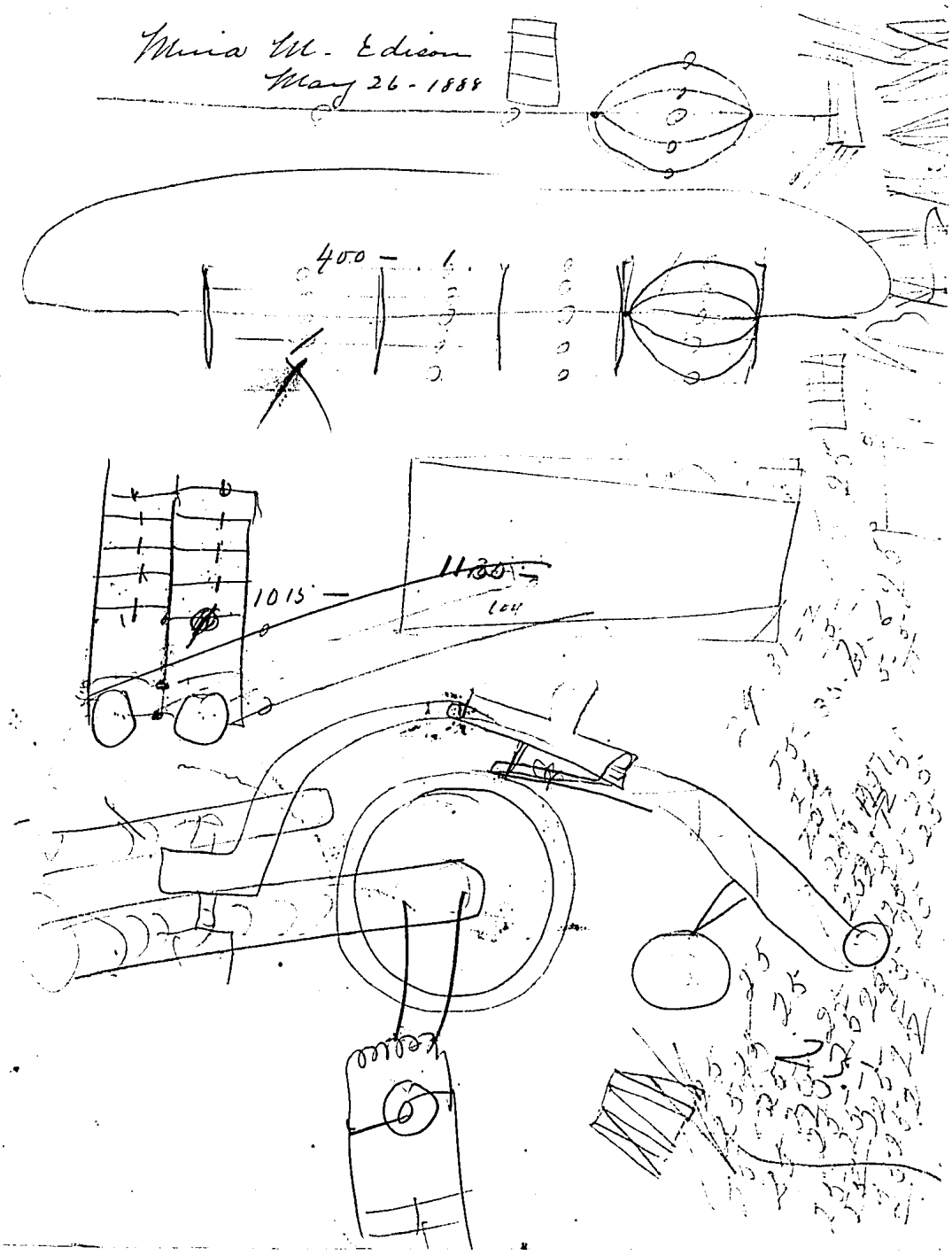
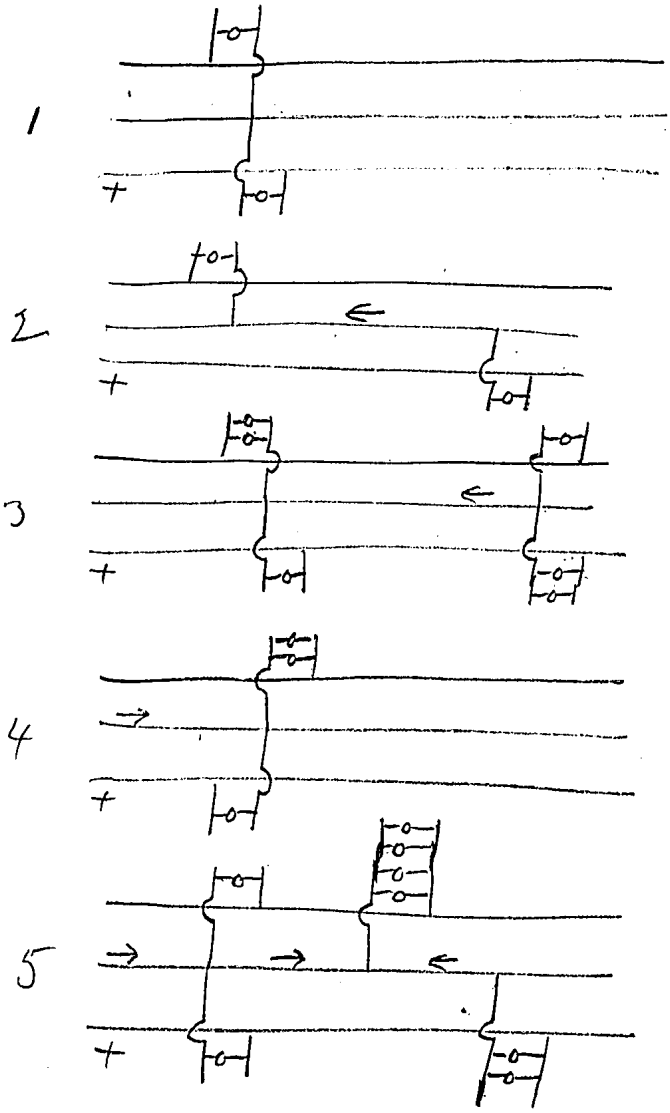
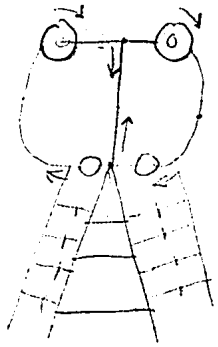
Thomas A. Edison
May 26 - 1888

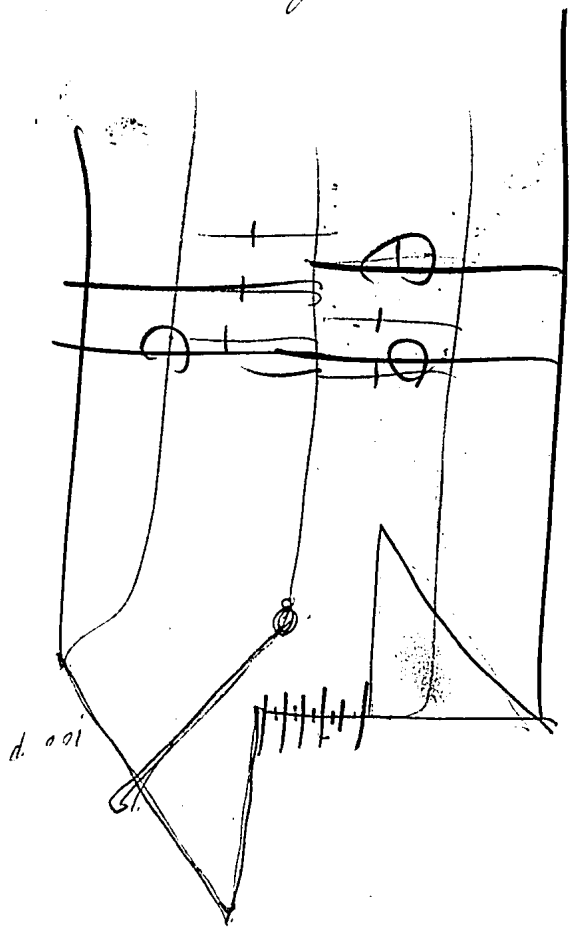


Thomas A. Edison
May 26 - 1888

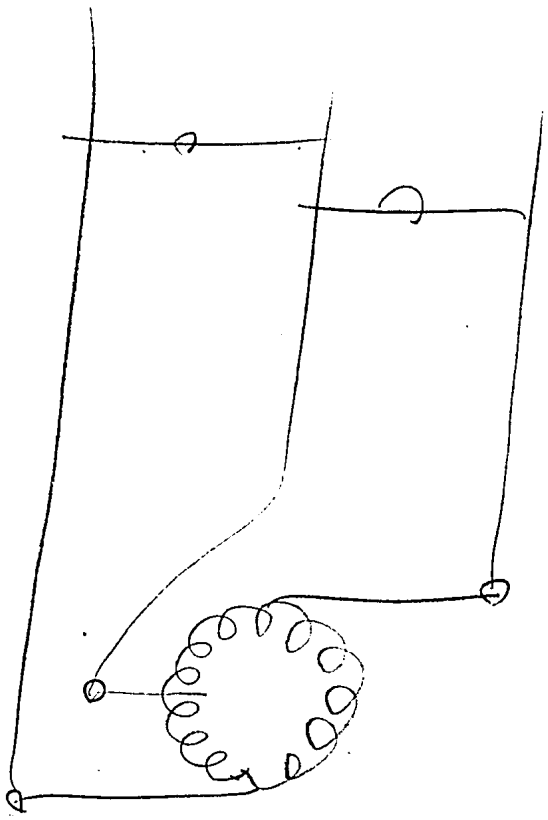




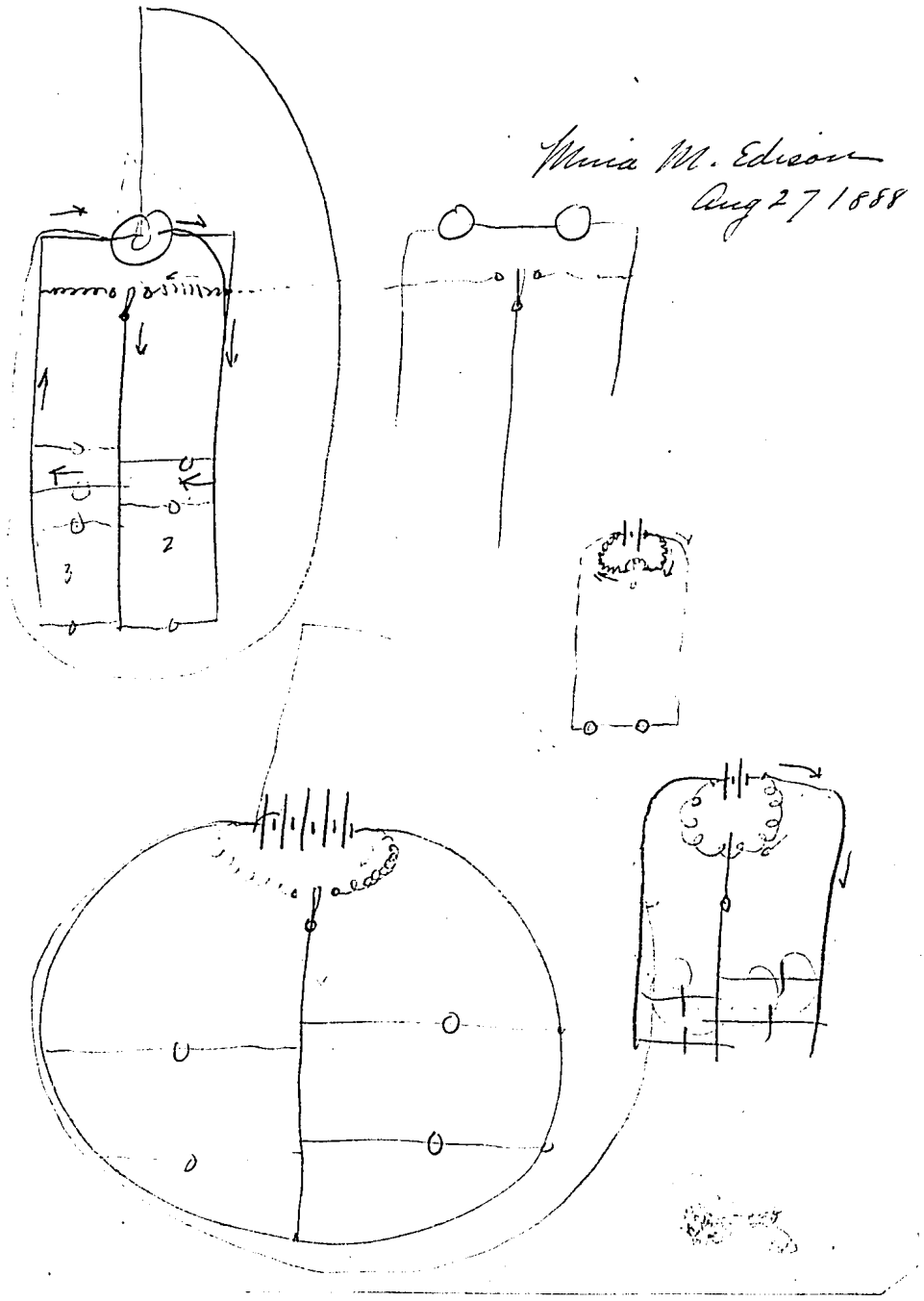
Thomas A. Edison
May 26 - 1888



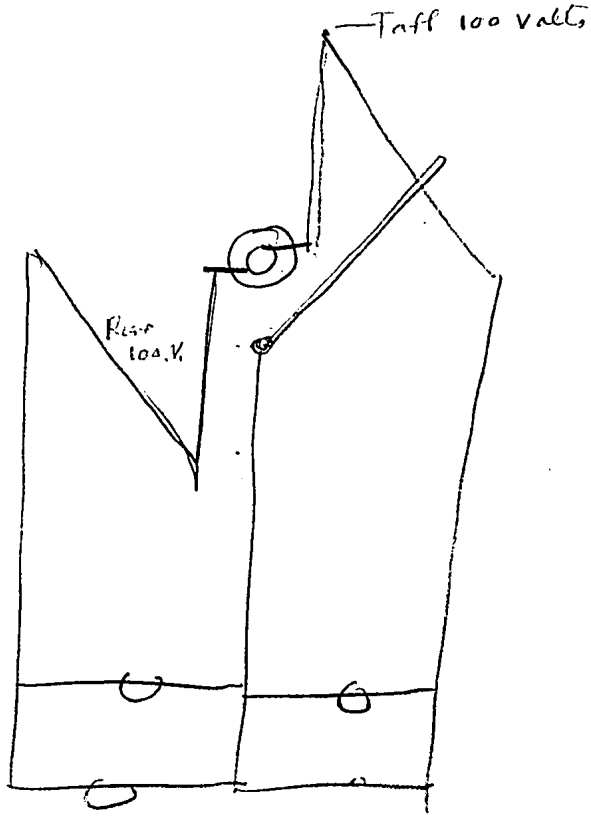
Maria M. Edison
May 26 - 1888

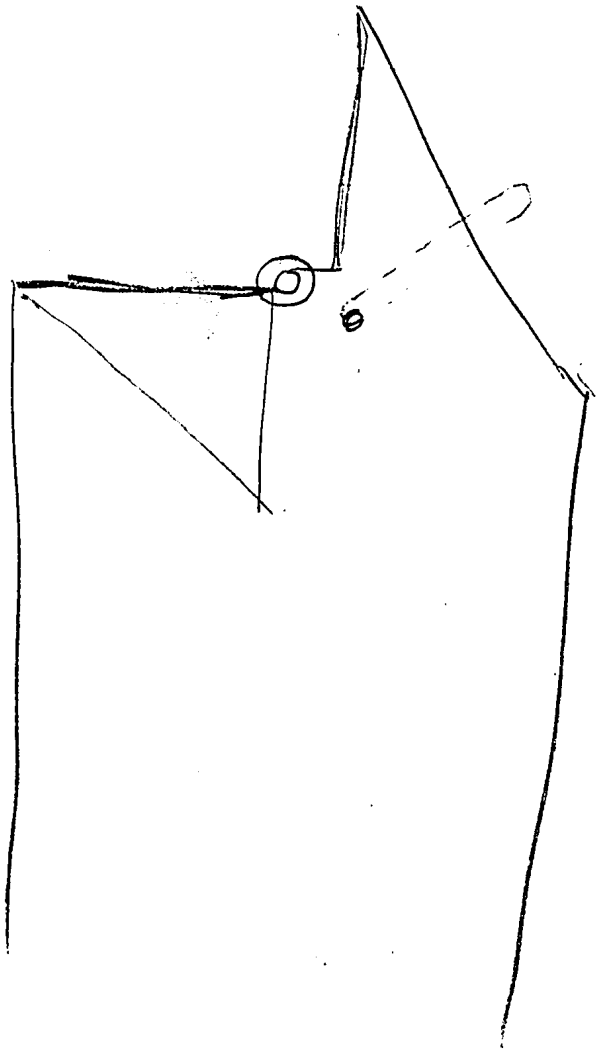


Maria M. Edison
Aug 27 1888

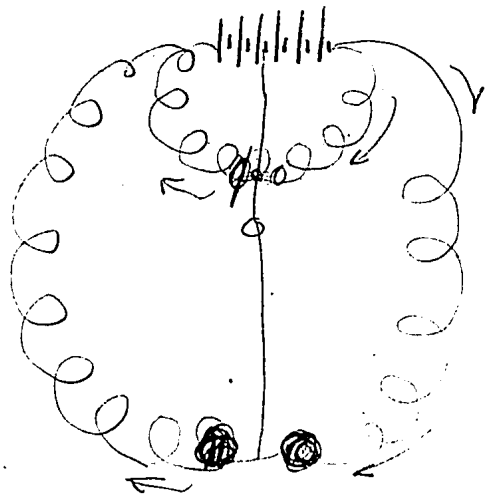


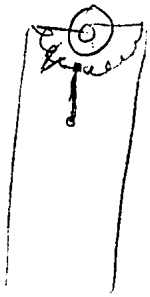
Maria M. Edison
Aug 27 - 1888

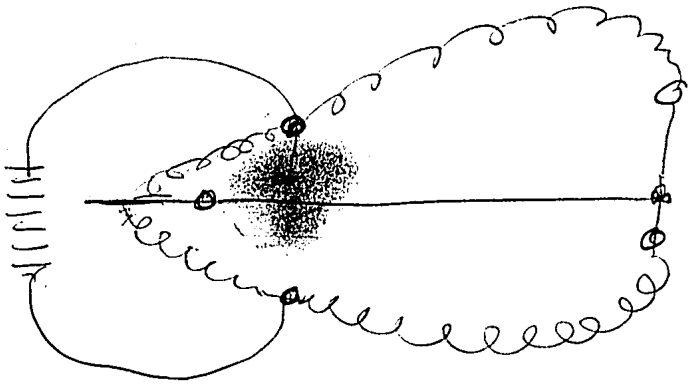


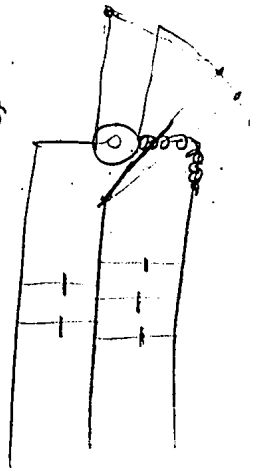


Maria M. Edison
Aug 27 1888









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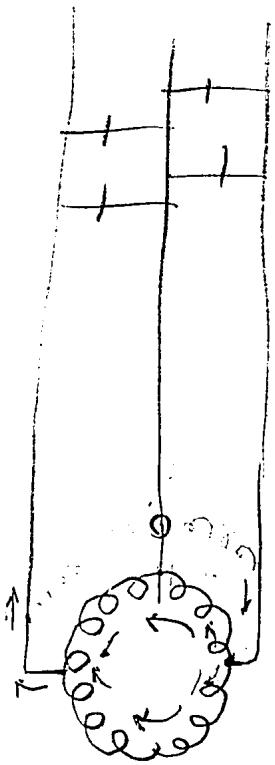
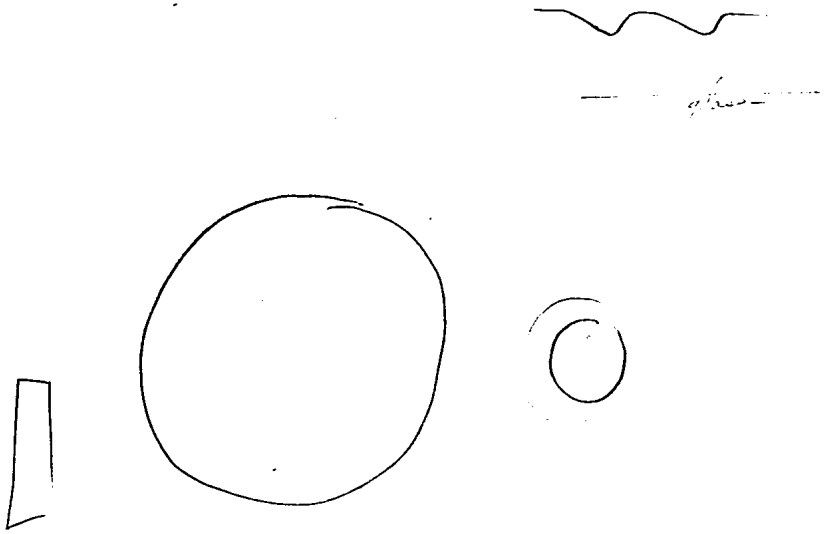
Aug 27, 1888





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From the Laboratory of

Thomas A. Edison.

Orange, N.J.

Subject, _____

2 wire	$32	same distance same % loss
3 "	12	
5 "	$5	

wire	size	no of wires	wt	
2	1		2	100
3	1/4		3/4	37 1/2
5	1/16		5/16	15 ±
6	1/25		6/25	12 10

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Subject, _____

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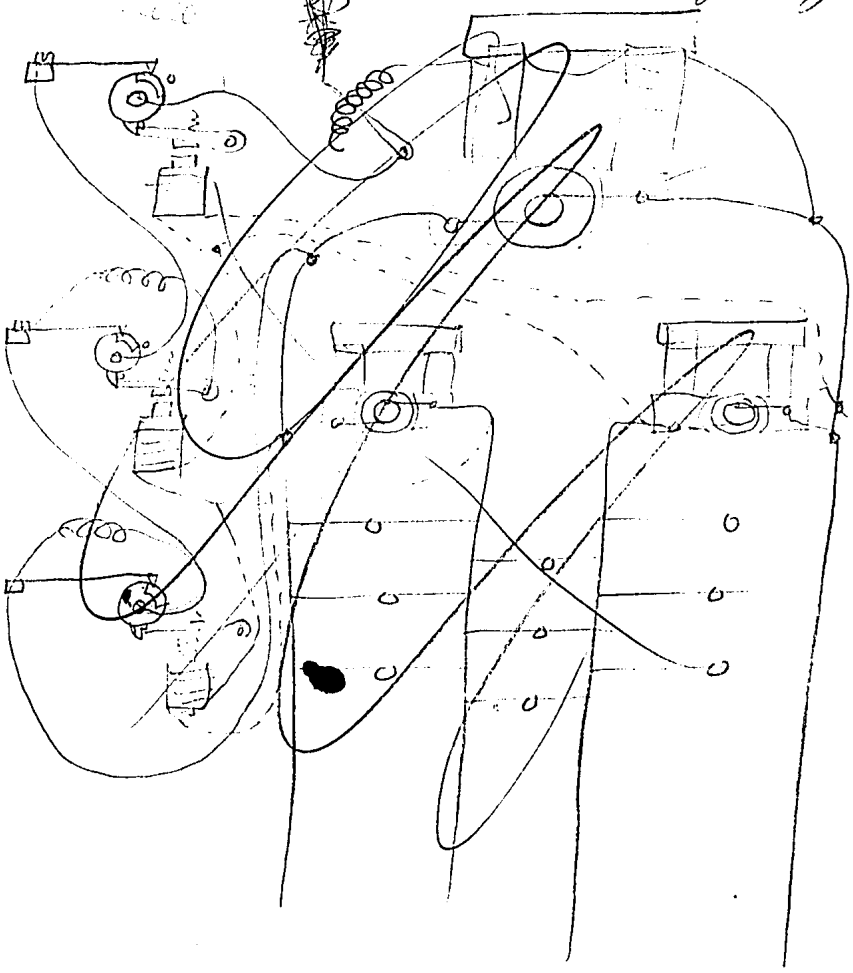

Fig 4

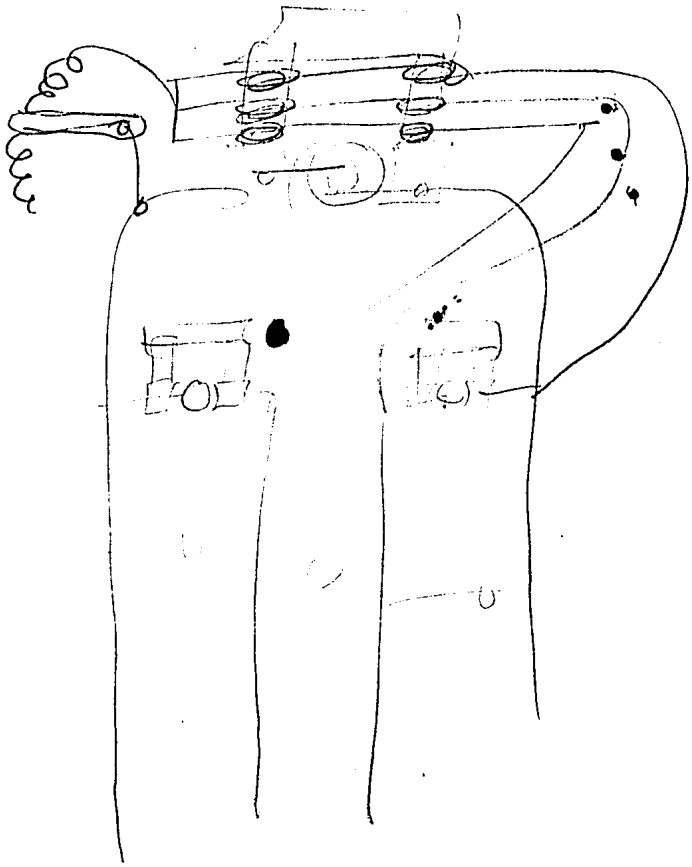

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Fig 1

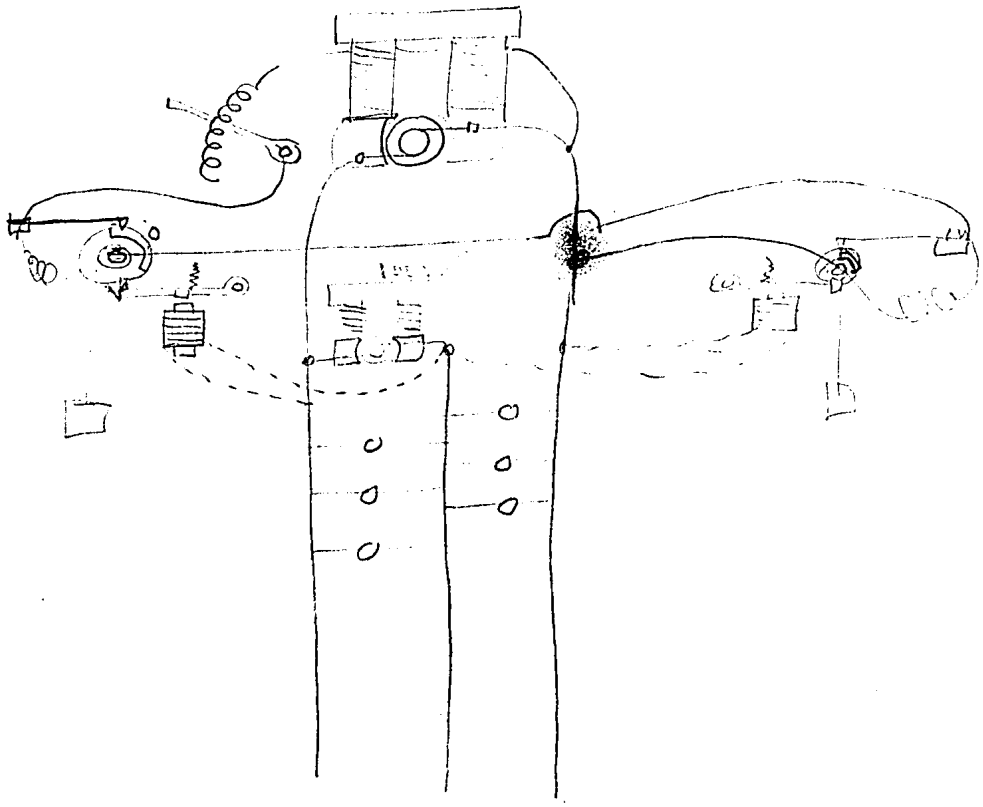

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fig 2

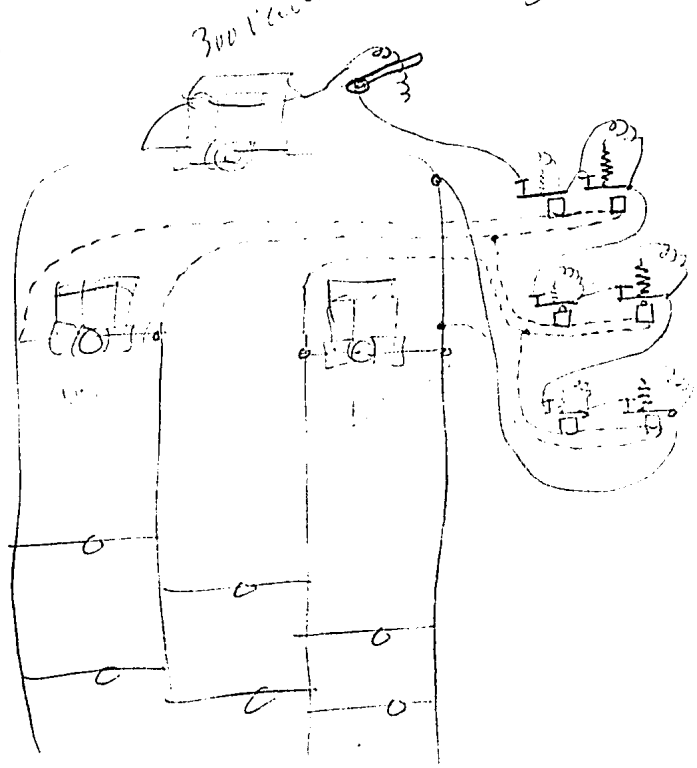

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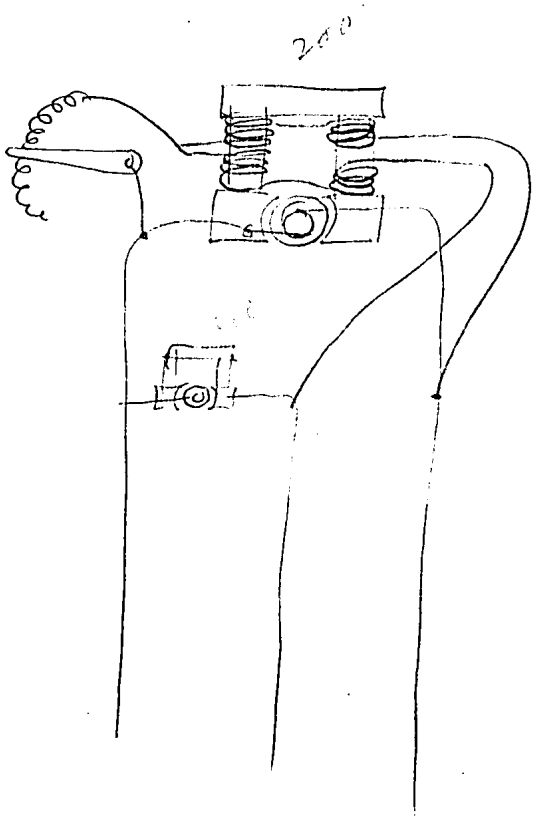
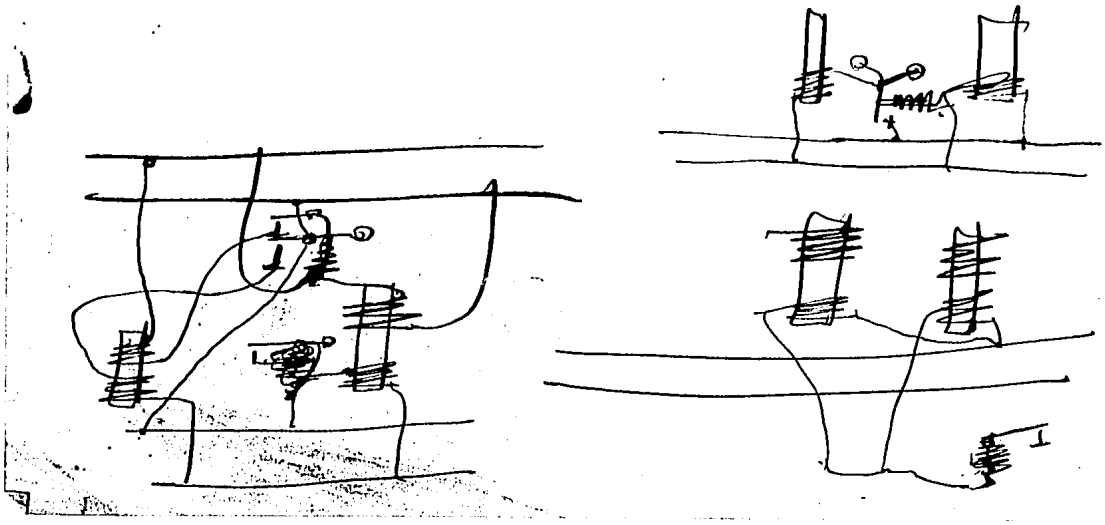
Fig 3





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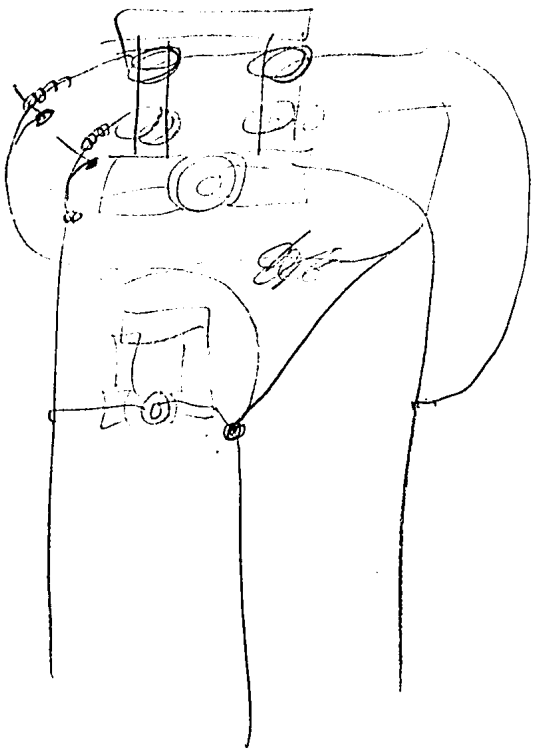
200 Volts!



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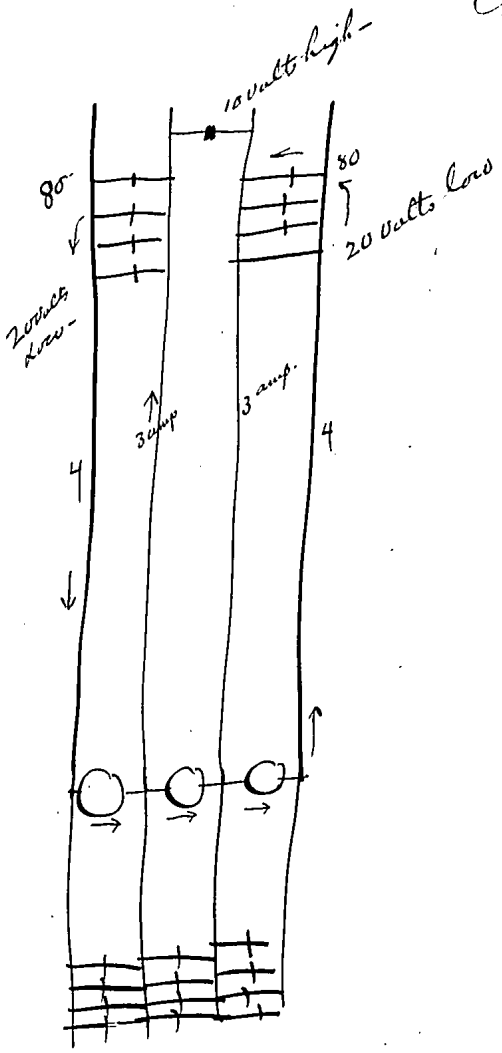

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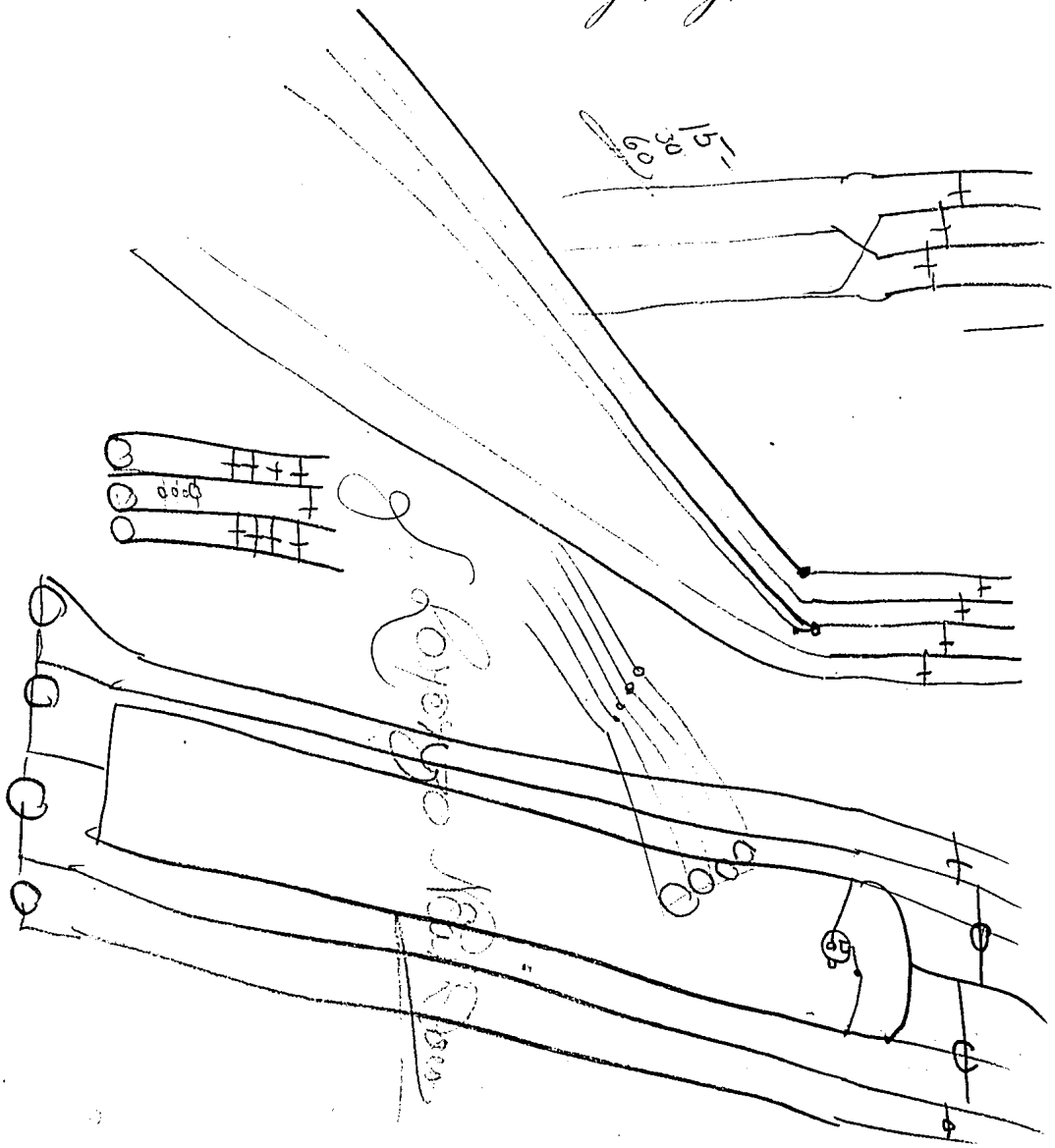

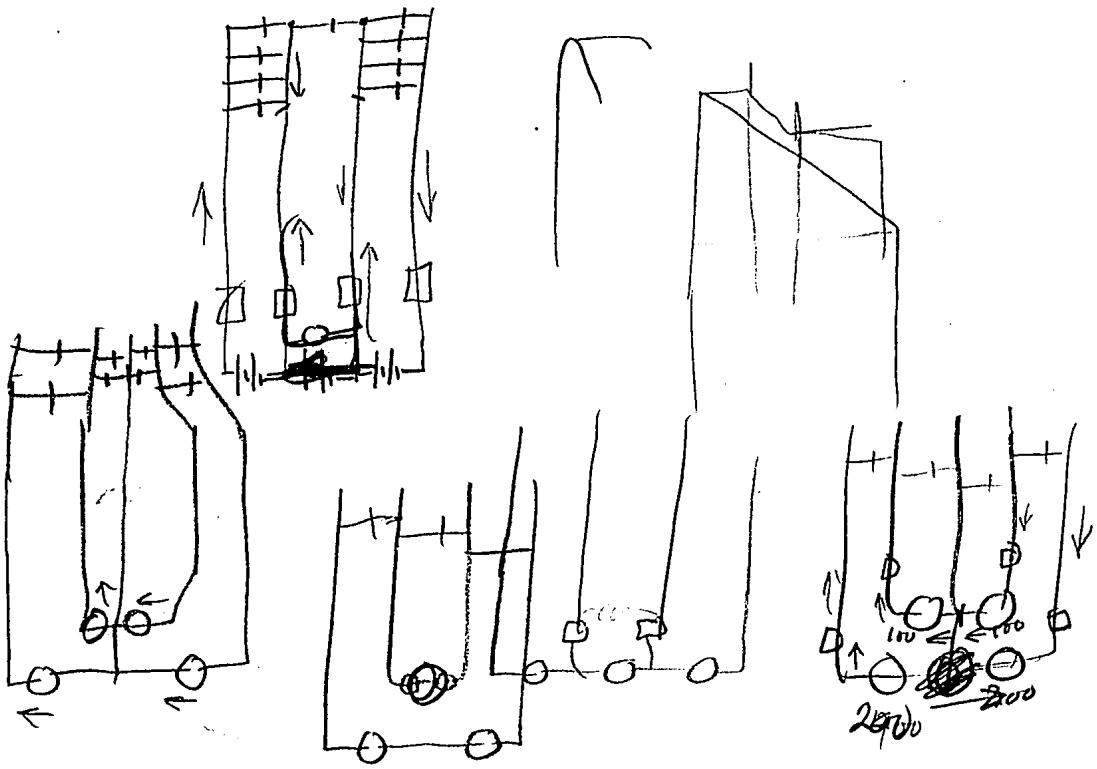
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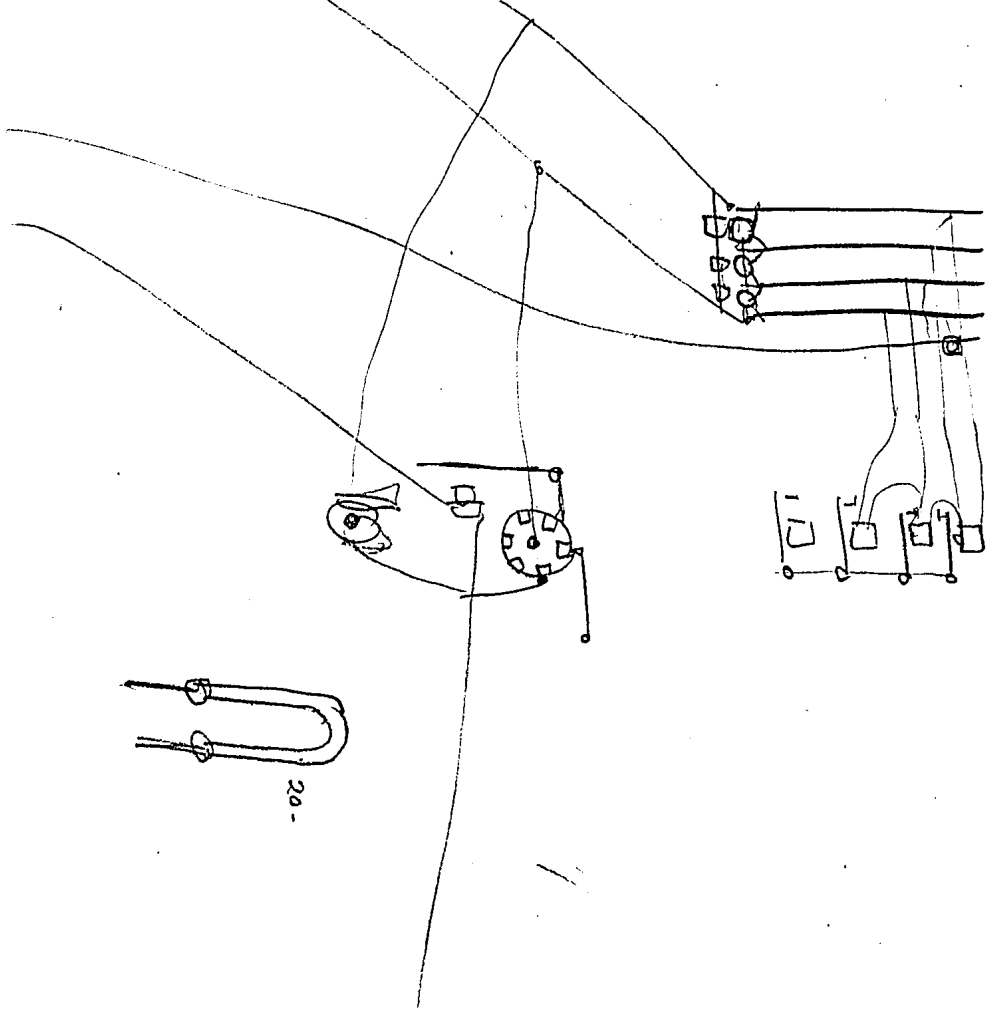

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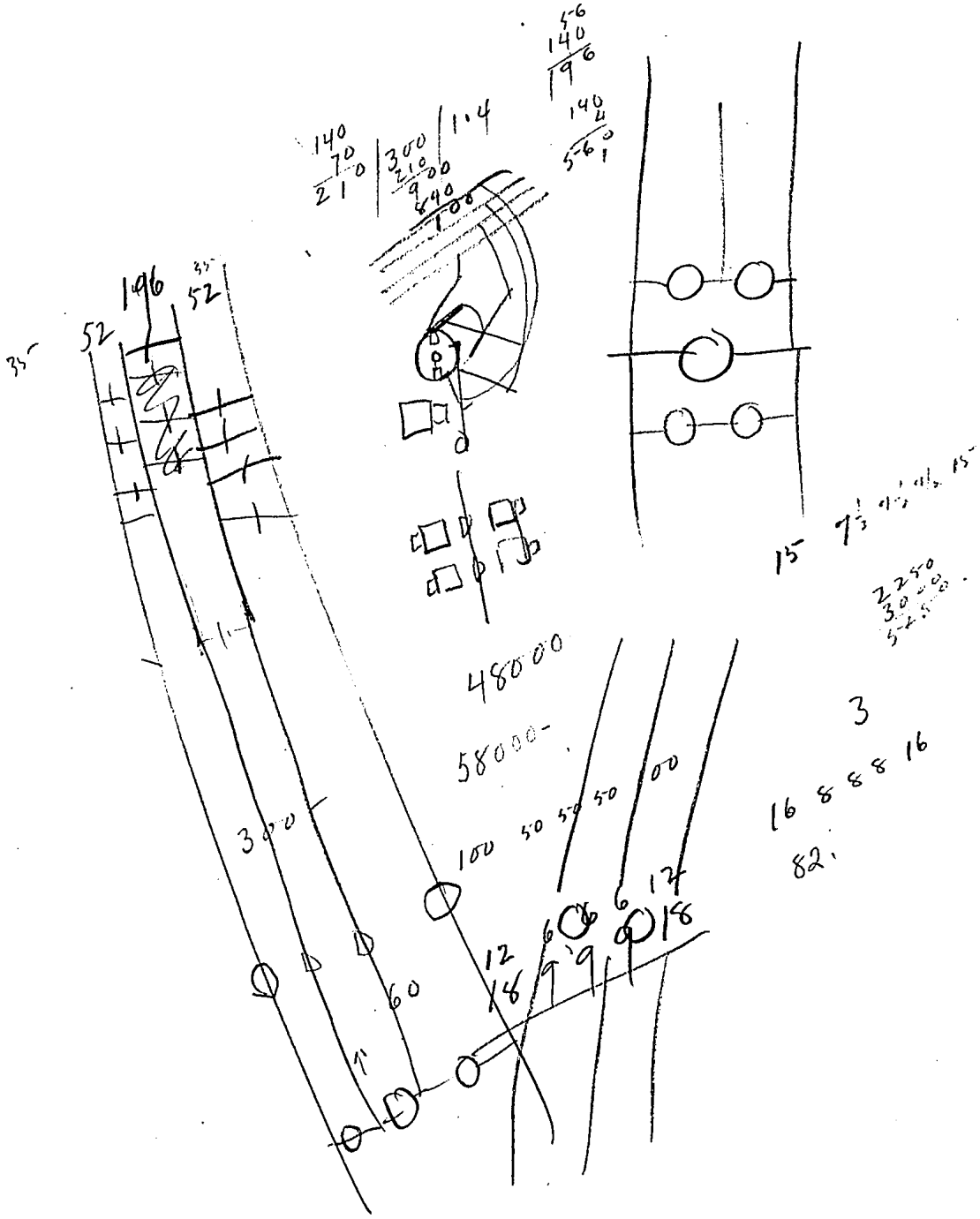
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